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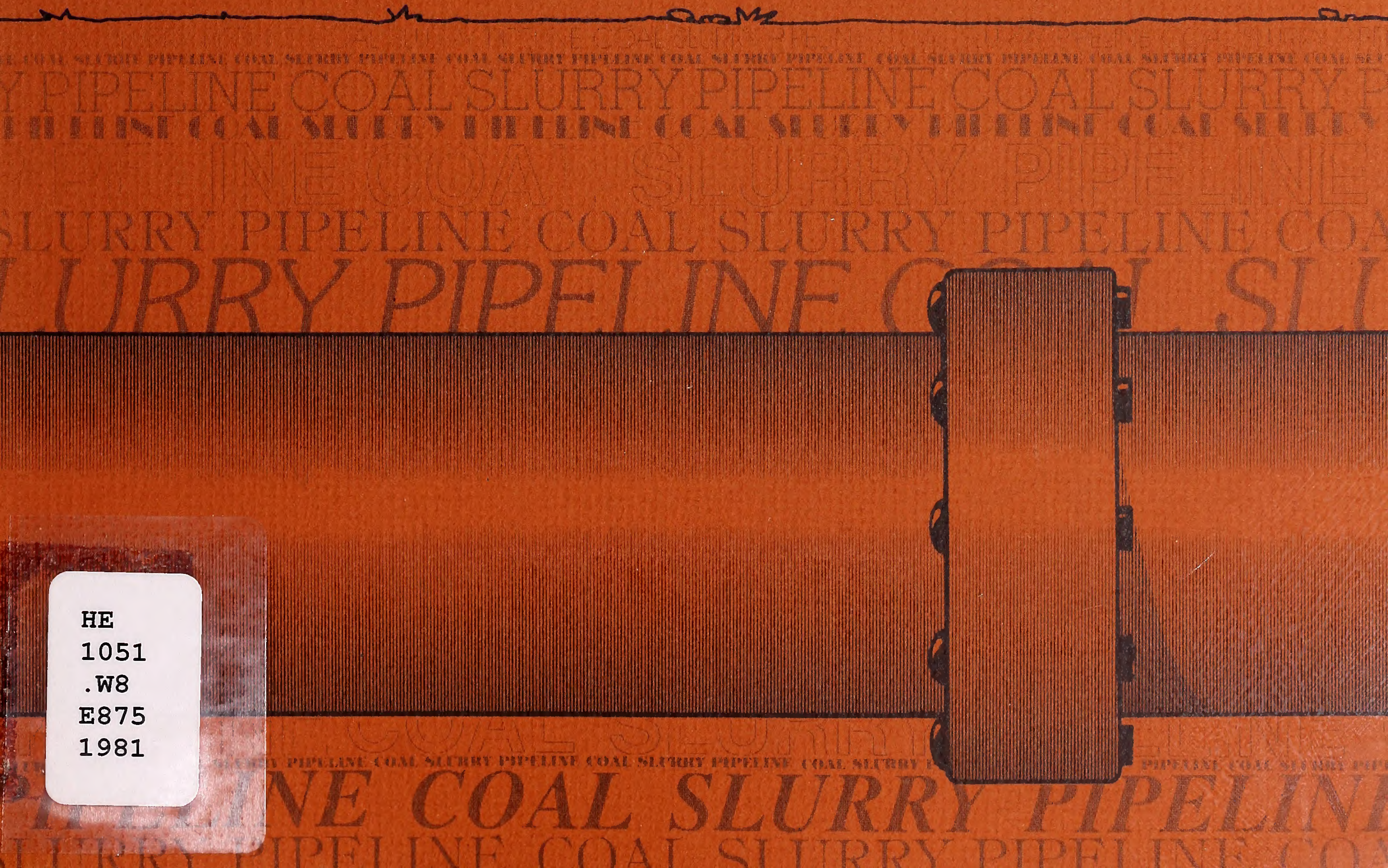
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NO-ACTION ALTERNATIVE
TECHNICAL REPORT

for the

ETSI Coal Slurry Pipeline Project

July 1981

Prepared by Woodward-Clyde Consultants for
U.S. Department of Interior, Bureau of Land Management

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NO-ACTION ALTERNATIVE
TECHNICAL REPORT

INTRODUCTION

A no-action alternative considers the options available if neither the proposed action nor any of its alternatives is approved. The coal slurry pipeline system is proposed as a new mode of transportation for Wyoming coal being shipped to Midsouth power plants. The modes of transportion currently available to the proposed Midsouth markets are all-railroad transportation or a combination of railroad and barge transportation. This report provides information on and analysis of the all-railroad no-action alternative, which would deliver an additional 37.4 million (short) tons annually (MMTA) of coal to the same nine Midsouth markets that would be supplied by the slurry pipeline.

This report addresses several specific questions that were raised at the public scoping meetings for the ETSI proposed action. These include the effects on railroad employment due to use of the pipeline, the impact on cities and towns that would be crew headquarters and maintenance stops, the impact of the pipeline on the financial stability of the railroads and the cost of moving coal by railroad instead of by pipeline.

The report is organized into four sections. Section I contains a brief summary of results. Section II is a detailed description of the rail alternative that reviews the current status of the available rail route. Section III contains the socioeconomic analysis and addresses the questions of employment and the various socioeconomic impacts on local areas. Section IV contains the cost analysis specific to the proposed rail route.

The information upon which this report is based has been taken from several sources. Except for the information which is identified as having been supplied by the railroads directly involved in the no-action alternative, no primary data has been collected. The range of issues addressed and the controversy concerning most of these issues precluded original data collection. Rather, the strategy has been to use available information to bound the problem, point out the range of anticipated impacts and leave the methodological discussions for those whose expertise is specifically in accident analysis, rail cost analysis or market analysis. Further, the rail industry is now in such a state of flux that it is impossible to make definitive, single-point estimates for many of the issues considered.

I. SUMMARY

This report presents the analysis of several socioeconomic issues as they relate to the railroad movement of 37.4 MMTA of coal from Wyoming to power plants in Oklahoma, Arkansas, and Louisiana. The issues discussed were raised at the public scoping meetings for the proposed ETSI coal slurry pipeline. Specifically they are:

- employment
- rail accidents
- community disruption
- cost of rail transportation

For the reader familiar with the large and growing literature analyzing the pipeline versus the railroad as a means of transporting coal, it should be kept in mind that this report is not an exhaustive treatment of that debate. The intent is to address the limited number of socioeconomic issues listed above. These socioeconomic issues are investigated for only one of several rail alternatives to the ETSI proposed action. As such this analysis provides dimensions, not final answers, to the issues discussed. For a variety of competitive and regulatory reasons there is no guarantee that the route analyzed would be the route actually used should the railroads as an industry haul the coal in question. It is the case, however, that the other rail alternatives could be expected to have similar impacts, on a different set of towns.

The route for the no-action rail alternative was specified by the railroads potentially involved. Following initial invitations to both the American Association of Railroads and the Western Railroad Association, representatives of Burlington-Northern (BN), the Atchison, Topeka and Santa Fe (AT&SF), and Kansas City Southern (KCS) met with BLM and Woodward-Clyde Consultants to provide the railroad routing given the mines, markets, and schedule for the pipeline. These railroads along with the Missouri-Pacific (MP) and the Missouri-

Kansas-Texas (MKT) continued to provide operating and maintenance information for the routes in question. Information on one of the alternative rail routes, discussed in Section II.7, was provided by representatives of Union Pacific.

I.1 Affected Population

The population affected by the proposed 37.4 MMTA shipment of coal is approximately 2.5 million persons distributed along more than 3600 unduplicated miles of track. Almost 20 percent of this affected population lives in Kansas City, Missouri, the major interchange point for the shipment.

It is estimated that along the most heavily traveled portion of the route (from Wyoming to Kansas City) there will be 39 trains per day by 1983, increasing to 48 trains per day by 1986. ETSI-related coal traffic would account for approximately 20 trains per day. South of Kansas City, current and future traffic projections show substantially fewer trains per day. ETSI-related traffic in this area would be at most 7.5 trains per day (going to Muskogee) and as few as 1 train per day along the most southern route segments.

Speeds along the route would vary. They would be slowest, averaging at most 30 to 40 miles per hour when underway, when the train is loaded, increasing to 50 to 60 miles per hour when empty. They would be fastest through Nebraska, where the train stops relatively infrequently, and slower in the southern portion, where there are more stops for inspection and/or crew change.

I.2 Rail Employment

Baseline Rail Employment. The employment related to the rail operation alone is estimated to be at most 2500. Whether this results in the same number of new jobs is a function of overemployment at some of the railroads as well as expected future gains in productivity. If, in the extreme, this employment results in both new jobs and new-to-the-area people, location-specific socioeconomic impacts would not be significant, since new workers would be distributed along the 3623 miles of unduplicated track and among more than 600 communities with population in excess of 2.5 million.

Employment related to rail maintenance and support staff could be an additional 3300 people. These would be located in such cities as Alliance, Nebraska, Kansas City, Missouri, and other cities identified as maintenance or inspection stops. Again, because of the number of towns where these people could be expected to settle, the only town identified as one likely to be significantly impacted is Alliance, Nebraska.

A majority of Alliance's population is dependent upon Burlington Northern for employment and so tends to be supportive of further rail-related growth. While housing construction has increased as the population has increased, there has not been a similar growth in retail services, particularly entertainment.

I.3 Rail-Related Accidents

Based on the safety records of all U.S. railroads, it was estimated that the transport of 37.4 MMTA of coal would result in approximately 48 grade crossing accidents per year, in which there would be 51 nonfatal casualties and 12 fatal casualties. (Railroad employees and passengers account for an additional 2 nonfatal casualties and 0.1 additional fatality.) Considering the superior safety record of coal trains, however, these figures represent an upper bound. During 1977 and 1978, BN coal trains experienced an accident rate one-third that of all other BN trains. Hence, it is expected that the actual number of casualties and deaths would be 17 and 4, respectively.

I.4 Community Disruption

Community disruption is due largely to the presence of at-grade crossings, which when occupied by a train result in passenger vehicle delay as well as possibly emergency vehicle delay. More than 600 communities would be potentially so affected.

The potential for impact of the all-rail alternative is illustrated in Table I-1, which shows the approximate number of trains daily due to the shipment of 37.4 MMTA of coal, and the affected populations along the route. Delays due to this traffic would depend on the speed of the train which is a function of track conditions, grade, equipment and traffic control systems.

Precise estimates of the impacts due to the 37.4 MMTA-related traffic are further complicated by the fact that the railroads have been working extensively

TABLE I-1

TONNAGE, AFFECTED POPULATION, AND NUMBER OF TRAINS, BY ROUTE SEGMENT

Route Segment		Annual Tonnage	No. of Towns[a]	Estimated Minimum Population[b]	Approximate No. of Daily Trains[c]
Wyoming Mines -	Kansas City	37.4	102	813,451	20.0
Kansas City -	Ponca City	6.6	30	102,855	3.6
	Newport	5.0	76	208,090	2.7
	Pryor	3.0	29	58,773	1.6
	Muskogee	13.8	46	108,900	7.5
Muskogee -	White Bluff	8.8	49	132,927	4.8
White Bluff -	Alexandria	3.8	63	194,405	2.1
Alexandria -	Boyce	1.8	1	50,744	1.0
	New Roads	2.0	26	327,598	1.1
Kansas City -	Shreveport	9.0	83	317,749	4.9
Shreveport -	Lake Charles	4.0	36	108,562	2.2
	Wilton	5.0	42	58,806	2.7

[a] For a list of the major towns traversed by the route, see Appendix A.

[b] Population estimates include towns for which U.S. census data are available.

[c] 1.848 tons per year per train per day (PMM 1979b).

with individual towns to relieve perceived or anticipated problems. While it could be expected that related impacts would be the most severe in towns in Nebraska, it is impossible to predict the magnitude due to other projected increases in rail traffic and the changes that these may induce as well as the dispersement of effects that would occur should the traffic split and move over another route (see section II.7). Changes such as rerouting tracks around a city that is now bisected by the railroad (such as Broken Bow), would mean that there would be no impacts.

The movement of 37.4 MMTA alone would not cause significant community disruption. Considered with other rail traffic and expectations for growth in this traffic, however, it could cause significant disruption. While this disruption cannot be identified by town or quantified for the whole of the route, it can be noted that there are increasing local attempts to correct current rail-related problems. If it is assumed that a community's willingness to spend funds for a rerouting or other rail modification effort is an adequate indication of a significant rail-related disruption, then in towns such as Lincoln the current impacts are significant and it can be expected that in the future such impacts in other towns will also be significant.

ETSI-Related Employment. Except for the Wilton site, all of the ETSI markets will be served by railroads prior to completion and operation of the pipeline (Boyce 1979). Thus, if a pipeline were constructed, there could be a loss of specific markets for the railroads. Due to the projections for continued overall increase in coal movement by the railroads, it is not expected that over the total rail system there would be a decline in traffic and hence decreased employment. Most likely the railroads would replace the lost markets with new markets. What would result would be a shift in the rail routes used and a possible shift in employment from one rail line to another. These shifts cannot be estimated, as they would be affected by railroad marketing decisions and competitive conditions within the rail industry.

I.5 Cost of Rail Transportation

Many studies have attempted to compare the relative costs of moving coal by rail versus slurry pipeline. In all cases the results are dependent upon assumed system throughputs, length of haul, and required investments in facilities and operating costs. In one summary of comparative costs, railroad costs of moving 1,000,000 tons of coal approximately 500 miles are given as 0.7 cent per ton mile, while the cost of moving 20,000,000 tons of coal 1000 miles by slurry pipeline is given as 0.4 cent per ton mile. Given the route-specific nature of transportation costs, separate rail cost estimates were developed for each of the markets of the proposed action. These costs range from $11.06 per ton to deliver 3.0 MMTA of coal to Pryor, Oklahoma, to $18.31 to deliver 2.0 MMTA to New Roads, Louisiana.

II. RAIL ROUTE DESCRIPTION

II.1 General Description

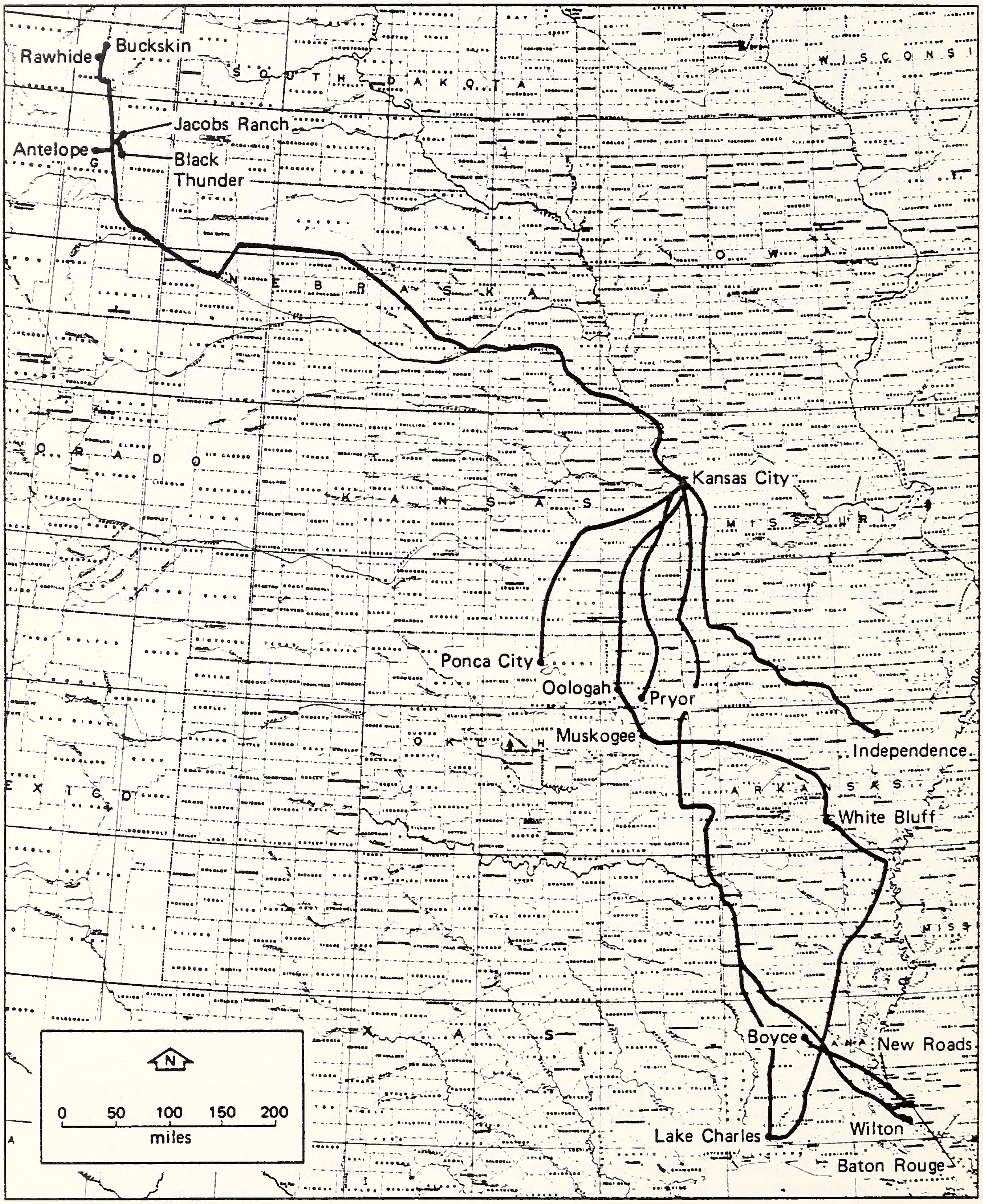
The shortest existing rail routes to the nine markets of the ETSI proposed action appear on Map II-1.[a] Coal would leave the Wyoming mines and be carried south over track owned jointly by Burlington Northern (BN) and Chicago and North Western (C&NW) to Shawnee Junction, Wyoming. From there the traffic would move over the BN system to Kansas City, Missouri, where it would be picked up by the connecting railroad: Missouri-Pacific; Kansas City Southern; Atchison, Topeka and Santa Fe; or Missouri-Kansas-Texas.

The coal would be transported in unit trains. The typical unit coal train would be made up of 100 to 110 cars, each carrying 100 tons of coal, plus three to five locomotives, depending on the grades and curves of the track. The unit train would operate continuously between the mine and the generating plant with intermediate stops only for servicing or crew changes, but not for delivery or receipt of other freight. Schedules for all aspects of train operation—train loading, volume transported, time of mine departure, plant arrival time—would be predetermined.

Coal cars are of three types: the bottom hopper car, the longitudinal or sidegate car and the rotary dump gondola car. The capacity of each type can vary from 50 to 140 tons though western unit coal trains use only 100-ton cars. All three can be unloaded without uncoupling from the other cars in the train. Car unloading rates vary depending on the size and design of the hopper car as well as the on-site unloading and coal handling facilities of the receiving utility. The newest quick dump 100-ton hopper car can empty its load in about 15 seconds (McGraw 1979).

---

[a] It has been suggested that the "shortest" route to Kansas City uses track owned by C&NW and UP. As this track is not now capable of carrying the traffic under consideration, the BN route is considered the shortest existing route. Analysis by Harter Williams (1980) disagrees with the contention that the C&NW-UP route is shorter and finds the BN route the shortest route, existing or proposed.



Map II-1. RAILROAD ROUTES FOR ALTERNATIVE COAL DELIVERY SCHEME

The most up-to-date means of controlling railroad movement is done with centralized traffic control systems (CTC). Such a system allows remote control of a train from hundreds of miles away.

II.2 Railroad Capacity

Current Railroad Capacity. Table II-1 shows the system buildup for the proposed action. Except for the Wilton power plant site, it is anticipated that deliveries would be made by rail to these markets prior to delivery by pipeline.[a] If the 37.4 million tons of coal was the only freight moving over the designated route, the railroads as of 1980 have the capability to meet these commitments. Specifically:

- There is rail access to each mine (Lane and Miller 1978).
- There is rail access to each of the power plants.
- Throughout the rail route, there is mainline track, category A or B (U.S. DOT 1977a, Appendix A).[b]

Hence, it appears that for this shipment alone there would be no requirements for additional acreage for new rail routes, and there would be no need for additional equipment.

If the 37.4 MMTA is considered as an addition to existing traffic along the route, it appears that there could be requirements for expansion of capability along that portion of the route which is now most heavily traveled and which would carry all of the proposed shipment - the portion from the Wyoming mines to Kansas City. These requirements for system upgrading are discussed under Future Railroad Capacity.

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[a] It is possible to deliver coal to the New Roads site via rail though the railroads have indicated that that is not the preferred means of transportation. Instead, coal would travel from the Wyoming mine to St. Louis via BN and then move by barge from St. Louis to the New Roads power plant site (Boyce 1980a).

[b] It should be noted that the FRA designation of mainline carries no implication of unit train capability.

TABLE II-1

SYSTEM BUILDUP SCHEDULE FOR PROPOSED ACTION MARKETS

Mine	Delivery	Delivery Schedule (MMTA, as-mined coal)												
		By unit train												
Site	Terminal	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Black Thunder	Ponca City	—	—	1.6	3.3	3.3	3.3	3.3	3.3	3.3	4.9	6.6	6.6	6.6
North Rawhide	Pryor	—	—	—	—	1.5	1.5	1.5	1.5	1.5	3.0	3.0	3.0	3.0
Black Thunder	Muskogee	1.6	3.3	3.3	3.3	3.3	3.3	5.0	5.0	5.0	5.0	5.0	5.0	5.0
North Antelope	Independence	—	—	—	—	—	—	2.5	2.5	5.0	5.0	5.0	5.0	5.0
Jacobs Ranch	White Bluff	—	—	—	2.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Jacobs Ranch	Boyce	—	—	—	—	—	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Jacobs Ranch	Lake Charles	—	—	—	—	—	2.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0
Buckskin	New Roads	—	—	—	—	—	—	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Antelope	Wilton	—	—	—	—	—	—	—	—	—	—	2.5	2.5	5.0
	Total	1.6	3.3	4.9	9.1	13.1	16.9	23.1	23.1	27.6	30.7	34.9	34.9	37.4
	Trains per day[a]	1	2	3	5	7	9	13	13	15	17	19	19	20

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[a] Coal tonnage is converted to trains per day using a factor of 1.848 million net tons per train per day.

It is possible that at the Wilton site new rail spurs would be needed, but these would most likely be constructed on power company land and would be the responsibility of the power company. For the other eight sites, no new rail construction is anticipated.

Map II-2 shows the layout of the coal unloading and processing facilities at the White Bluff power plant of Arkansas Power and Light (AP&L). These facilities are typical of most power projects and show how the rail network is an integral part of the overall power plant design. The rail network is laid at the time that the first unit is built and is designed so that no new rail system is needed as additional units come on line. In such a system, coal is brought by unit train to a central location where it is then moved by conveyor systems to either storage or crushing. The only circumstances requiring a new railroad spur would be the addition of numerous power plant units, covering a large land area, for which one central facility could not handle and distribute the additional coal. Construction of additional rail would be the responsibility of the power company (Cox 1980). It is not anticipated that this will be required at any of the eight sites.

Future Railroad Capacity - Wyoming to Kansas City. Table II-2 shows the estimated number of trains per day traveling over the BN system between the Powder River Basin and Kansas City for the period 1977 to 1991. Table II-2a shows a more recent set of estimates for this same route, though for slightly different segments. These estimates, completed in 1979, include trains devoted to carrying general merchandise, Montana coal, non-joint-line[a] coal from the Eastern Powder River Basin (EPRB), and BN/C&NW joint-line EPRB coal. The estimates of the number of trains (PMM 1979b) reflect the following:

- For merchandise trains, use of BN actual traffic in 1977 and anticipated traffic in 1983. Use of these numbers to project merchandise traffic in 1986 and 1991.
- For coal traffic in 1977 and 1983, use of BN figures. Projections in 1986 and 1991 were based on production estimates for the Powder River Basin.

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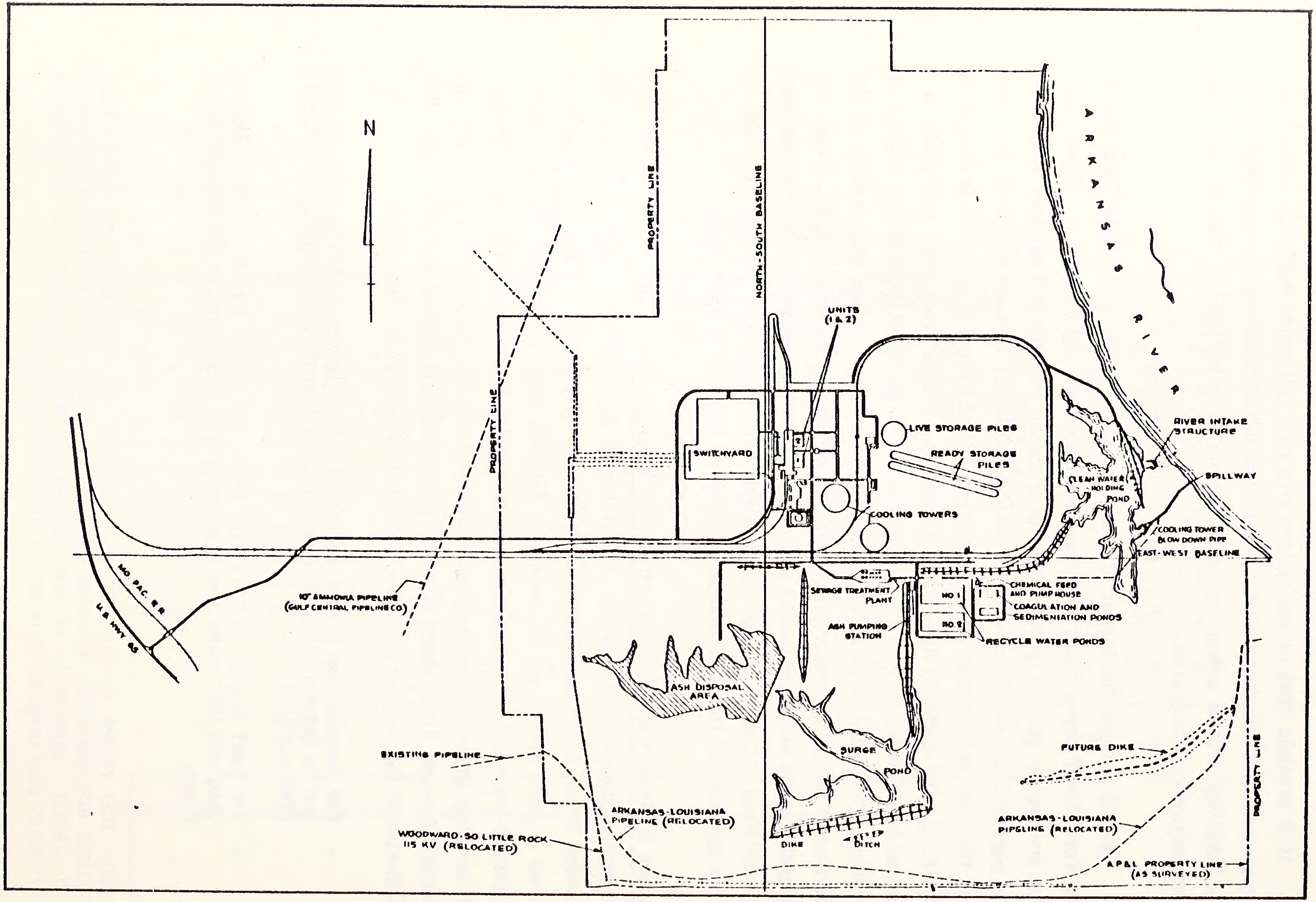
[a] Joint line refers to the 116 mile segment of track between Coal Creek Junction and Shawnee, Wyoming built by BN under joint ownership agreement with C&NW. Ownership of this segment is being questioned as are rules of carriage of coal originating in mines along the segment.



SOURCE: U.S. Army Corps of Engineers 1977, p. 1-3

Map II-2. WHITE BLUFF SITE PLAN

- All coal production from the Powder River Basin would be hauled over the only existing route, and that is the BN route.
- Coal tonnage is converted to trains using a factor or 1.848 million net tons per year per train per day. This factor assumes 11,000 net tons per loaded train, one empty train for each loaded train, and 336 days of operation per year.

The non-joint-line coal originates in mines that are north of ARCO Junction but still part of the EPRB. Coal from the EPRB that originates on the BN/C&NW joint line is assumed to be routed equally between the Gillette-Alliance line and the Orin Junction-Alliance line.

The trains per day shown in Tables II-2 and II-2a represent the required capacity on each segment that must be available by each of the years shown if BN alone carried all of the anticipated traffic. If there are no other rail carriers or alternative modes of transporting the coal, BN would be required to undertake substantial upgrading in order to handle all coal produced in the Powder River Basin. Based on construction plans provided to Peat, Marwick, Mitchell & Co. by BN, the following discussion describes each segment as it will be in 1983. Table II-3 shows the capacity that will result from these construction plans. For all segments between the mines and Kansas City, the capacity in place by 1983 will be sufficient to carry the 23.1 million tons of coal, requiring 13 trains per day that are projected for that date (Table II-1). Further, the rail capacity would be sufficient to carry the 1991 traffic of 37.4 MMTA, requiring 20 trains per day. These construction plans will be implemented independent of the ETSI project. The estimates of train traffic, as well as the route description, are from the report by Peat, Marwick, Mitchell & Co. (1979b).

Orin Junction-Wendover. This segment is a single-track train order operation and will have to be upgraded by 1983 to single-track CTC with 2.5 mile sidings spaced 7 miles apart. This will provide capacity for 30 to 35 trains per day. To achieve this capacity, BN will have to add signaling to about 31 miles of track and will have to add one siding.

Wendover-Northport. The configuration of this segment is identical to the Orin Junction-Wendover segment. In 1983, there will be capacity requirement

TABLE II-2

ESTIMATED NUMBER OF TRAINS PER DAY OVER BN ROUTE

	Trains per Day			
Route Segment	1977	1983	1986	1991
Orin Junction - Wendover	4	30	39	68
Wendover - Northport	4	29	38	67
Northport - Alliance	9	23	35	58
Alliance - Ravenna	19	50	74	130
Ravenna - Grand Island	17	48	72	128
Grand Island - Aurora	25	57	82	139
Aurora - Lincoln	25	54	78	131
Lincoln - Table Rock	8	24	32	51
Table Rock - Napier	8	24	32	51
Napier - Kansas City	17	31	40	60

Source: Peat, Marwick, Mitchell & Co. 1979b, p. II-7, 11.

TABLE II-2a

ESTIMATED NUMBER OF TRAINS PER DAY OVER BN ROUTE

	Trains per Day	
Route Segment	BN 1983	BN 1986
Bridger Junction - Wendover	35	41
Guernsey - Northport	33	38
Northport - Alliance	19	23
Alliance - Ravenna	36	45
Ravenna - Grand Island	36	45
Grand Island - Aurora	39	48
Aurora - Lincoln	39	48
Lancaster - Falls City	25	28
Falls City - Napier	25	29
Napier - St. Joseph	33	37

Source: Boyce 1981

TABLE II-3

BURLINGTON NORTHERN CAPACITY, 1983

Route Segment	Trains per Day
Orin Junction - Wendover	35
Wendover - Northport	35
Northport - Alliance	35
Alliance - Ravenna	70
Ravenna - Grand Island	55
Grand Island - Aurora	70
Aurora - Lincoln	125
Lincoln - Table Rock	25
Table Rock - Napier	25
Napier - Kansas City	35

Source: Peat, Marwick, Mitchell and Co. 1979b.

for 29 trains per day. The current BN track capital plan does not anticipate upgrading this line. However, because of the need to meet the 1983 requirements, this line will have to be upgraded to 2.5 mile sidings 7 miles apart. This configuration would provide capacity for 30-35 trains per day.

Northport-Alliance. By 1983, BN will have a requirement of 23 trains per day over this segment. At that time, the configuration will be single track with 2.5-mile sidings spaced 7 miles apart. Since this provides capacity for 30 to 35 trains per day, there will be no requirement for further upgrading of this line through 1986.

Alliance-Ravenna. By 1983, BN will have a capacity requirement over this segment of 50 trains per day. The track configuration in 1983 calls for 50 percent double-track CTC. Since this configuration provides capacity for 60 to 70 trains per day, there would be no requirement for further upgrading of this line by 1983.

Ravenna-Grand Island. By 1983, BN will have a minimum capacity requirement on this segment of 48 trains per day. The current BN track capital plan anticipates this segment to have a configuration of single-track CTC with 5-mile sidings spaced 7 miles apart. Based on BN estimates, this configuration provides capacity for 40 to 45 trains per day. Therefore, this segment should be designed for 1/4 double track with full CTC by alternating 10 miles of double track and 30 miles of single track. BN estimates the latter configuration to have a capacity for 50 to 55 trains per day.

Grand Island-Aurora. By 1983, BN will have a capacity requirement on this line of 57 trains per day. The upgraded configuration planned for 1983 would include 1/2 double track and would accommodate 60 to 70 trains per day.

Aurora-Lincoln. By 1983, BN will have a capacity requirement on this line of 54 trains per day. The track configuration in 1983 calls for double track with full CTC. Since this track configuration provides capacity for 75 to 125 trains per day, there would be no requirement for additional upgrading of this segment through 1986.

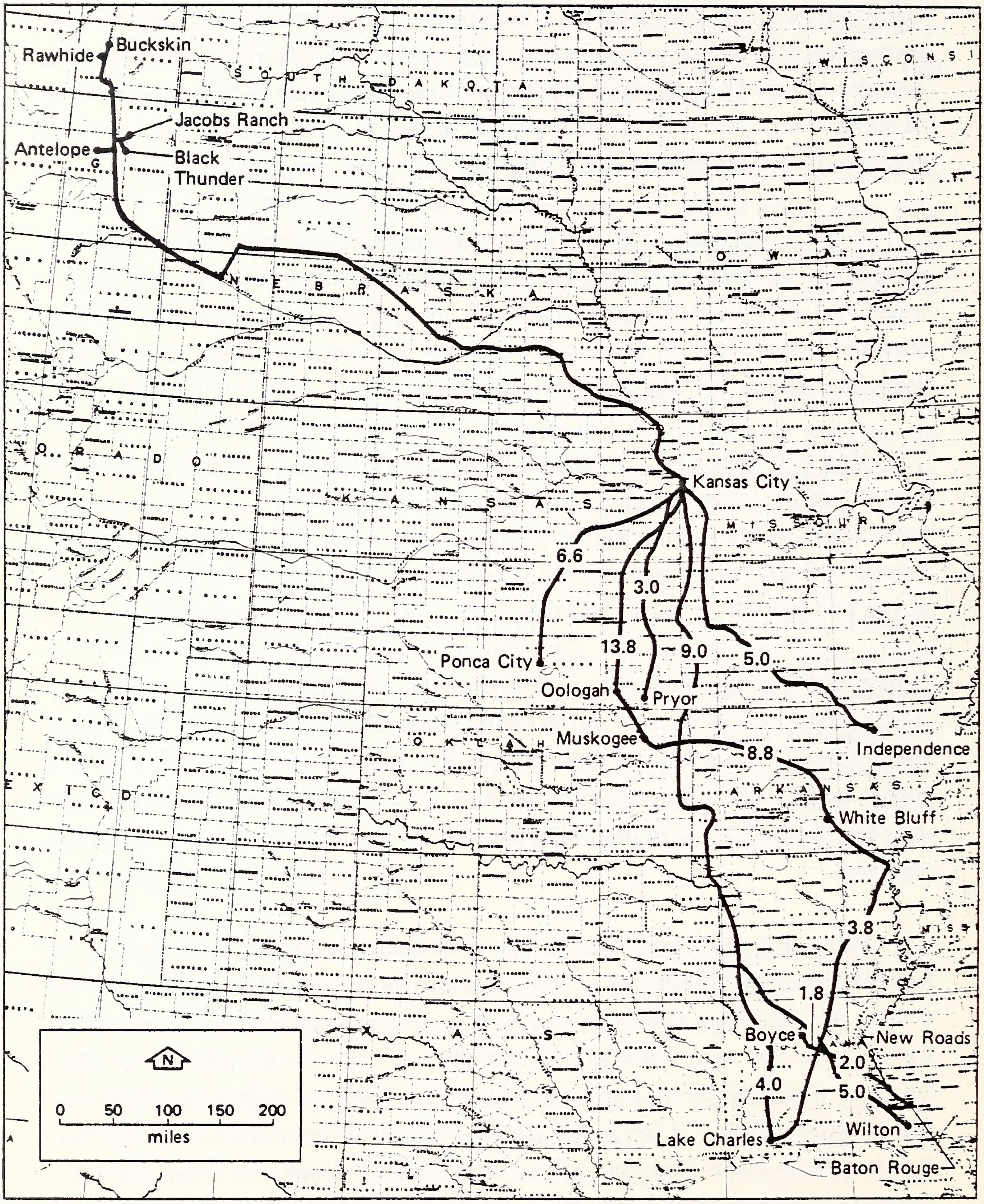
Lincoln-Table Rock. By 1983, BN will have a capacity requirement of 24 trains per day over this segment. The track configuration, according to BN's track plan, will be single-track train order operation. Since this will provide a capacity of only 10 to 15 trains per day, this segment would be upgraded by 1983 to single-track CTC with 2.5-mile sidings spaced 11 miles apart. This upgraded configuration would provide capacity for 20 to 25 trains per day.

Table Rock-Napier. By 1983, BN will have a capacity requirement on this segment of 24 trains per day. The track configuration in 1983 will be single-track CTC with 2.5-mile sidings spaced 11 miles apart. This track configuration provides capacity for 20 to 25 trains per day so there would be no additional upgrading required on this segment by 1983.

Napier-Kansas City. By 1983, BN will have a capacity requirement on the segment of 31 trains per day. The track configuration in 1983 will be single track with 2.5-mile sidings spaced 7 miles apart. Since this configuration would provide capacity on the segment for 30 to 35 trains per day, no further upgrading of this line would be required by 1983.

Future Railroad Capacity--Kansas City to Midsouth Utilities. A total of 37.4 MMTA would be carried from the Wyoming mines to Kansas City over BN tracks. The tonnages that would be carried over the major segments of the southern portion of the rail route are shown in Map II-3. Delivery of coal to the nine markets of the ETSI proposed action involves multiple use of several of the rail segments.

Table II-4 shows for one of the nine southern routes (Kansas City to Redfield) the rail capacity as of 1975, the traffic in 1975, and the forecast of traffic for 1983. As this table shows, MP anticipates substantial increases in traffic along this route between 1977 and 1983. Given the capacity as of 1975, however, it appears that over most segments MP will be able to accommodate this increased traffic, which is due almost exclusively to increased coal traffic. Despite the in-place capacity, MP has undertaken a large-scale track upgrading program. Approximately 182 miles (71 percent) of the 256 miles of track



Map II-3. TONNAGES TO BE CARRIED OVER SOUTHERN PORTIONS OF RAILROAD ROUTE

TABLE II-4

RAIL CAPACITY VERSUS TRAFFIC: KANSAS CITY TO REDFIELD (WHITE BLUFF), ARKANSAS

Route Segment	Trains per Day Capacity 1975[a]	 Traffic 1975[b]	 Traffic 1983[b]
Kansas City - Osawatomie	51	13.2	36.0
Osawatomie - Durand	33	10.4	28.9
Durand - Dearing	25	10.4	29.3
Dearing - Okay	30	10.7	30.0
Okay - Van Buren	28	5.3	17.3
Van Buren - N. Little Rock	NA	5.7	15.5
N. Little Rock	NA	9.3	17.3

[a] PMM 1979a.

[b] ICC 1978 and conversion factor of 1.848 million net tons per year per train per day.

between Kansas City and Inola, Oklahoma, have been relaid. Between Inola and Little Rock (254 miles), MP plans to relay 241 miles (95 percent) of track. In addition, sidings will be added that will expand the capacity between Osawatomie and Little Rock. Specifically, the Durand-Dearing segment will be expanded so that it will meet projected needs. All of this work is scheduled for completion by 1983 and is independent of the ETSI project (ICC 1978). ETSI-related traffic along this route would account for at most 5 trains per day, but most of it would be carried prior to operation of the pipeline (Table II-1). Further, many of the line segments that would handle Redfield coal will also carry varying numbers of other unit coal trains destined for other areas and hence are part of the reason for MP's extensive ($23 million) capital improvement program scheduled for completion by 1983 (ICC 1978).

II.3 Railroad Operation

Understanding the operation of a single unit train requires the consideration of equipment specifications and operating parameters. Equipment specifications are the number of trains, and the number, size, and type of cars and locomotives in each train. The operating parameters are the cycle time, the crew changes, the fueling needs, and maintenance needs. These considerations are established from the fuel use analysis, which considers the total amount of coal to be hauled, the amount per day, the contract period, the mine location and its loading facilities, the utility plant location and its unloading facilities, material handling, and storage facilities.

Based on the above considerations, the railroads that would be involved in the movement of coal from the five Wyoming mines to the nine proposed markets have provided their equipment specifications and operating assumptions. These are summarized in Table II-5 which shows for each mine-market combination the originating railroad, the delivering railroad, the distance, and the cycle time. Railroad operations are generally quite similar, especially in the case of unit-train traffic over mainline track. A detailed route description therefore is given for only one of the nine mine-market combinations—Jacobs Ranch to White Bluff. The description of the 5 MMTA movement which is given below is based on the rate case presented to the ICC and reflects anticipated railroad

TABLE II-5

OPERATING PARAMETERS FOR RAILROAD DELIVERY TO MARKETS OF PROPOSED ACTION

Mine	Market	Receiving Railroad	Delivering Railroad	Round-Trip Distance (miles)	Round-Trip Time (hours)	Days
North Rawhide	Pryor, OK	BN	MKT	2076.2	122.25	5.09
Black Thunder	Ponca City, OK	BN	AT&SF	2200.3	124.45	5.19
Black Thunder	Muskogee, OK	BN	MP	2241.8	133.25	5.55
Jacobs Ranch	White Bluff, AR	BN	MP	2730.4	158.25	6.59
North Antelope	Independence, AR	BN	MP	2433.4	151.45	6.31
Jacobs Ranch	Boyce, LA	BN	MP	3302.6	187.45	7.81
Jacobs Ranch	Lake Charles, LA	BN	KCS	3147.5	200.75	8.36
Buckskin	New Roads, LA	BN	MP	3448.4	237.75	9.91
Antelope	Wilton, LA	BN	KCS	3272.8	217.95	9.08

Source: Boyce 1980a.

operations (ICC 1978). For each of the other routes, tables summarizing the relevant details are contained in Appendix B.

Table II-6 summarizes the schedule of activities at various points between Jacobs Ranch, Wyoming, and the White Bluff power plant at Redfield, Arkansas. The starting point for the description of the operation of the unit coal trains, however, is Alliance, Nebraska, the last major service point in the empty train cycle prior to its arrival at the mine in Wyoming. The train would be yarded in Alliance for the purpose of making a safety inspection of the cars, servicing and inspecting the locomotives, performing train switching as required, and accomplishing an initial terminal air brake inspection prior to departure. The operational and safety compliance inspection would be carried out by six to eight carmen, depending on the terminal's demands for mechanical manpower at that time.

Cars failing inspection would be removed from the train by either a switch crew or the road crew, and replaced with cars from the standby equipment pool to maintain the planned 110-car capacity. Those cars requiring maintenance that cannot be accomplished while the car is in the train would be moved to a repair track where they would be stored until required repairs have been accomplished. After the car is repaired, it would be added to the standby pool of cars and used to fill out another train at some future time. The switch crew typically used to accomplish the movement of cars would consist of an engineer and two switchmen working under the direction of a switch foreman.

In addition to the removal of bad order cars, those cars scheduled for regular maintenance could be removed from the trains at Alliance and subsequently moved to their designated repair location. When cars are removed from the train for this purpose, replacement cars from the standby pool would be added to the train. The point where these cars would actually be removed from the train depends on arrangements with the facility performing the maintenance for the utility owning the cars.

Alliance is the primary servicing point for coal-assigned locomotives serving trains on the southern and central portions of BN. To facilitate the

TABLE II-6

UNIT COAL TRAIN SCHEDULE FROM JACOBS RANCH MINE TO REDFIELD (WHITE BLUFF), ARKANSAS

Location	Mileage	Cumulative Mileage	Activity	Required Locomotives	Number of Crew
Jacobs Ranch			Load, Inspect Train		
Jacobs Ranch-Guernsey	132.7	132.7		5	1
Guernsey			Crew Change		
Guernsey-Alliance	128.8	261.5		5	1
Alliance			Crew Change, Inspect Train, Inspect & Service Locomotives		
Alliance-Ravenna	237.8	499.3		3	1
Ravenna			Crew Change		
Ravenna-Lincoln	126.3	625.6		3	1
Lincoln			Crew Change, Inspect Train, Fuel & Service Locomotives		
Lincoln-St. Joseph	146.9	772.5		3	1
St. Joseph			Crew Change		
St. Joseph-Kansas City	57.7	830.2		3	1
Kansas City			Crew Change, Interchange & Inspect Train		
Kansas City-Osawatomie	55.3	885.5		3	1
Osawatomie			Crew Change, Pull-by Inspection		
Osawatomie - Coffeyville	133.4	1018.9		3	1
Dixon			Standing Inspection		
Coffeyville			Crew Change, Pull-By Inspection		
Coffeyville - Van Buren	165.6	1184.5		3	1
Lenapah			Refuel, 500-Mile Brake Inspection		
Claremore			Standing Inspection		
Upson			Standing Inspection		
Van Buren			Crew Change, Pull-by Inspection		
Van Buren - N. Little Rock	153.2	1337.7		3	1
Alix			Standing Inspection		
Morrilton			Standing Inspection		
N. Little Rock			Crew Change, Pull-by Inspection		
N. Little Rock-Redfield	27.5	1365.2		3	1
Redfield			Unload Coal, Crew Change		
Redfield - N. Little Rock	27.5	1392.7		3	1
N. Little Rock			Pull-by Inspection		

TABLE II-6 (Concluded)

Location	Mileage	Cumulative Mileage	Activity	Required Locomotives	Number of Crew
N. Little Rock-Van Buren	153.2	1545.9		3	1
Morrilton			Standing Inspection		
Alix			Standing Inspection		
Van Buren			Crow Change, Pull-by Inspection		
Van Buren-Coffeyville	165.6	1711.5		3	1
Upson			Standing Inspection		
Claremore			Standing Inspection		
Lenapah			Standing Inspection		
Coffeyville			Crew Change, Pull-by Inspection		
Coffeyville - Osawatomie	133.4	1844.9		3	1
Dixon			Inspection		
Osawatomie			Crew Change, Refuel, Brake Inspection		
Osawatomie-Kansas City	55.3	1900.2		3	1
Kansas City			Crew Change, Interchange & Inspect Train		
Kansas City-St. Joseph					
St. Joseph	57.7	1957.9	Crew Change	3	1
St. Joseph-Lincoln	146.9	2104.8		3	1
Lincoln			Crew Change, Inspect Train, Fuel, Service & Inspect Locomotives		
Lincoln-Ravenna	126.3	2231.1		3	1
Ravenna			Crew Change		
Ravenna-Alliance	237.8	2468.9		3	1
Alliance			Crew Change, Inspect Train, Fuel & Service Locomotives		
Alliance-Guernsey	128.8	2597.7		5	1
Guernsey			Crew Change		
Guernsey-Jacobs Ranch	132.7	2730.4		5	1

Source: ICC 1978, Appendix MMD-1.

complete servicing of the locomotives without undue train delay, the locomotives of empty unit coal trains arriving at Alliance would be replaced by locomotives that have been inspected and serviced. The in-bound locomotive unit would be moved to the servicing facilities to be given the required inspection and made ready for use on a subsequent out-bound train.

A BN road crew consisting of an engineer, conductor and two brakemen would operate the empty train from Alliance to Guernsey, Wyoming, where a crew change would take place. The new road crew takes the train from Guernsey to the mine, where the train would be loaded.

At the mine, the empty cars would be weighed as they moved over a weigh-in-motion scale. The train would be loaded by moving the cars at a one-half mph controlled speed under the loading shoots. The tariff provides four hours for loading the train. When loading is completed, the train would move over the outbound scale to complete weighing of the train.

A crew change would take place in the vicinity of the mine. A crew would be driven by automobile from Gillette to the crew change point; the inbound crew would return to Gillette to be relieved from duty. The crew would perform a 500-mile air brake test as required by the Power Brake Law (49 CFR 232) before the train leaves the mine.

The Gillette crew would operate the loaded train back to Guernsey, Wyoming where a crew change would take place. The new Alliance-based crew would take the train from Guernsey to Alliance, a distance of 129 miles.

At Alliance, the train would be yarded and a 500-mile inspection of the train again would be made by mechanical personnel. Any cars found needing repairs would be removed from the train. After inspection of the locomotives and train, a new crew would operate the train from Alliance to Ravenna, Nebraska, a distance of 238 miles. The next crew would board the train at Ravenna and operate the train to Lincoln, Nebraska, a distance of 126 miles.

At Lincoln, the train would again be inspected and the locomotives fueled and serviced. A new crew would operate the train from Lincoln to St. Joseph, Missouri, a distance of 147 miles. A new crew would then operate the train from St. Joseph to Kansas City, a distance of 58 miles.

On arrival at Kansas City, the BN road crew would deliver the train directly to the yard of the connecting railroad (Missouri Pacific; Kansas City Southern; Atchison, Topeka and Santa Fe; Missouri-Kansas-Texas). (On the return to Kansas City, the connecting railroad would deliver the train directly to the BN's Murray Yard.) The planned cycle time performance for the unit trains from the Wyoming mines to Kansas City would be approximately 100 hours, which includes loading time at the mine.

For delivery to White Bluff, the MP would assume operation of the unit train at its Neff Yard in Kansas City, Missouri. The train would then be routed from Kansas City, through Osawatomie, Kansas; Coffeyville, Kansas; Van Buren, Arkansas; and Little Rock, Arkansas, to the Redfield-White Bluff area. This 535-mile line of MP is single track, with the exception of 6 miles of double track between Neff Yard and Leeds Junction on the MP Kansas City Terminal Division.

The train delivered by the BN to MP at Neff Yard would consist of 110 loaded cars, 3 coal service locomotives, and a caboose. The cars would be loaded to over 100 net tons per car, not to exceed 263,000 pounds gross weight per car.

The outbound MP road crew would operate the train to Osawatomie, Kansas, a distance of 55 miles. The time scheduled for the Kansas City-Osawatomie segment would be 3.12 hours, comprised of 2.25 hours running time and 0.87 hours reserve time to compensate for train meetings, passings, and other delays.

At Osawatomie a "pull-by" inspection would be made by a new crew in 0.25 hour (15 minutes). This crew, whose home terminal is Osawatomie, would then operate the train the 133.4 miles to Coffeyville, Kansas. There are several places on this segment of the route where the grade is steep enough (1.00 percent) to present train starting problems arising from train meetings and passings and restrictive signal indications. A standing inspection of 0.3 hour (18 minutes) would take place at Dixon. The average distance between sidings on this segment is 12.2 miles. The scheduled time for the run from Osawatomie to Coffeyville is 5.39 hours, with 4.14 hours running time, 0.30 hour for inspection, and 0.95 hour reserve time.

At Coffeyville, 0.25 hour (15 minutes) would be needed for a crew change and a "pull-by" inspection by the new crew. This crew would then operate the train to Van Buren, Arkansas. This segment extends 165 miles over a rolling terrain. Of particular concern would be the steep south-bound grade (0.95 percent) between Elba, Oklahoma, and Sageeyah, Oklahoma. Even though the route gradually descends in a southward direction, particular care would be exercised by locomotive engineers to control train slack.

At Lenapah, Oklahoma, refueling would take place at a new fuel station between the main track and the siding (1879 gallons of fuel for each run-through unit and 1226 gallons for the fourth unit). The 500-mile inspection would also be made at Lenapah. Standing inspections would be made at Claremore and Upson. The schedule time over the Coffeyville-Van Buren segment would be 7.29 hours, composed of 4.77 hours running time, 1.35 hours refueling and inspection time, and 1.17 hours reserve time.

At Van Buren the crew would again be changed and a "pull-by" inspection made. The train would then move the 153.2 miles to North Little Rock. The entire segment would be protected by automatic block signals and the average distance between sidings would be about 10 miles. Intermediate stops would be scheduled at Alix and Morrilton for standing inspections of 0.3 hour each. The total time scheduled for the Van Buren Subdivision would be 6.04 hours (4.35 hours running time, 0.60 hours inspection time, and 1.09 hours reserve time).

At Little Rock the crew would be changed and a "pull-by" inspection made. This crew would then take the train approximately 25 miles on the Monroe Subdivision to the AP&L rotary car dump in the Redfield-White Bluff area.

At present, there is no track directly connecting Van Buren and Monroe, Arkansas. MP would need to reconstruct a connection between these towns in order to carry coal directly along the final line segment (Little Rock to White Bluff, Arkansas).

Once at the AP&L rotary car dump, the crew would spot the first car in the dump, apply the locomotive independent brake and detrain. AP&L employees and equipment would then take over and unload the train, while the MP crew would be kept off duty for purposes of the Hours of Service Law. Nevertheless, the crew would continue to be paid as required by the respective collective bargaining agreements. After the last car has been unloaded, the MP crew would entrain and return the train to Kansas City, reversing the above route. At the Kansas City Terminal Sheffield connection, the train would leave MP tracks and use the passenger mains of the Kansas City Terminal Railway to the KCT West Bluffs line and then to the Hannibal Bridge of the BN. The MP crew would yard the train at the direction of BN yardmasters. Scheduled time would be 4.25 hours (2.19 hours running time and 2.06 hours reserve time). At Murray Yard, the locomotive engineer would break the multiple unit connection between the fourth unit and the 3 run-through units, and the crew would return to Neff yard, where the fourth unit would match up with the next Redfield-White Bluff train.

The complete cycle time for the movement on MP (Kansas City to White Bluff and return) would be approximately 64 hours on an average basis. Each train would make 55 round trips per year, delivering 609,000 net tons per year. It is expected that 8 coal trains would run on this line. MP is purchasing 14 heavy-duty locomotive units specifically equipped for handling coal-carrying unit trains, which would be used to help power the 8 coal trains.

The estimated fuel consumption for the MP portion of the movement is 14,984 gallons. This figure was determined by use of MP's train performance simulator for running time; manual calculation for planned stop time for inspection, crews, fuel, etc.; manual calculation for unplanned stops for meets, passes, conflicting route movements, mechanical/maintenance of way delays, reacceleration following those stops; and manual calculations for the fourth locomotive unit layover time at Kansas City.

II.4 Time Frame

According to railroad construction plans, all new track, additions of sidings, and new control systems necessary to carry 37.4 million tons of coal annually would be in place prior to the start of pipeline delivery in 1985 (Boyce 1979).

The most critical link in the route is the segment of track in Wyoming connecting Donkey Creek and Orin. It was completed in 1979. This route runs through Campbell and Converse counties in the southern Powder River Basin and now provides the only rail access to the five mines.

II.5 Work Force

The work force required to operate an all rail system that would deliver coal to the proposed action markets is presented in Table II-7.

II.6 Project Components

Project components include the unit train, track and signal systems and in-place facilities such as maintenance yards and offices for centralized traffic control. Figure II-1 is an overview of a unit coal train transportation system.

Unit trains of 100 to 110 hopper cars each carrying 100 tons of coal would transport the coal from the Wyoming mines to the Midsouth power plants. The trains would be moved by special, high-horsepowered locomotives. Depending on the need for heavy haul capacity, portions of the track would be 136-pound per yard continuous welded rail, the heaviest in use on railroads today. In addition, portions of the route would be double tracked as a means of increasing the number of trains per day that could travel the route. Major maintenance facilities already exist in Alliance, Nebraska, and Kansas City, Missouri.

During actual operation, the number of locomotives included in the unit coal train may vary. An extra locomotive may be added if one must be returned to its assigned maintenance location for scheduled maintenance or inspection. An extra locomotive may also be added for extra power if any of the other locomotives were not running at normal efficiency.

TABLE II-7

OPERATIONS PERSONNEL ESTIMATES

Destination	Railroad	Number of Crews[a]	Inspection		Number of Trains[a]	Tons	Total Personnel			
			500-mi Brake[a]	Pull-by[a]			Crew[b]	Brake Inspec.[c]	Pull-by Inspec.[d]	Operations[e]
Kansas City	BN	12	3	2	8	37.4	48	12	2	398
Boyce	MP	14	3	16	3	1.8	56	12	16	196
Independence	MP	6	1	11	4	5.0	24	4	11	111
New Roads	MP	15	4	16	2	2.0	60	16	16	152
Muskogee	MP	5	0	4	1	5.0	20	0	4	24
White Bluff	MP	16	2	8	3	5.0	64	8	8	208
Lake Charles	KCS	14	3	4	9	4.0	56	12	4	520
Wilton	KCS	15	4	4	11	5.0	60	16	4	680
Ponca City	AT&SF	5	2		5	6.6	20	8		108
Pryor	MKT	4	1	1	4	3.0	16	4	1	69
										2466

Sources: Burlington Northern 1980; Kansas City Southern 1980; Missouri-Kansas-Texas Railroad Co. 1980; Missouri-Pacific Railroad Co. 1980.

BN = Burlington Northern
MKT = Missouri-Kansas-Texas
AT&SF = Atchison, Topeka, and Santa Fe
MP = Missouri-Pacific
KCS = Kansas City Southern

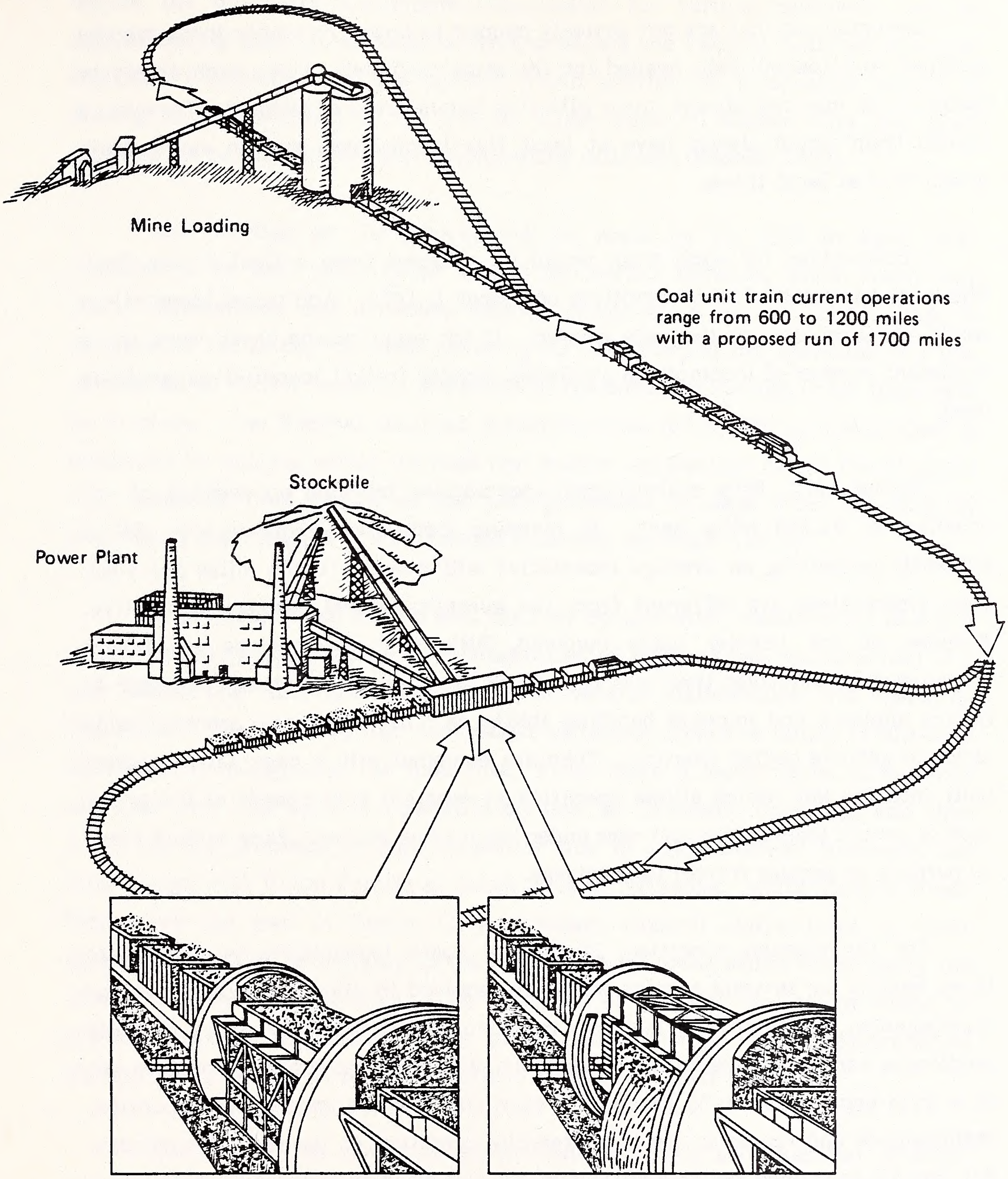
[a] Information supplied by involved railroads. Estimates include loaded and unloaded trains.

[b] Each crew has 4 people.

[c] Each brake inspection averages 4 people.

[d] Each pull-by inspection averages 1 person.

[e] Total operations personnel = (total crew x number of trains) + brake inspection personnel + pull-by inspection personnel.



Coal unit train current operations range from 600 to 1200 miles with a proposed run of 1700 miles

As train arrives at unloading area, the car locked in the dumping cradle ...

...rotates 180° to empty contents. Rotary coupler allows cars to remain coupled as a unit.

Source: U.S. House of Representatives, 1977.

Figure II-1. COAL UNIT TRAIN TRANSPORTATION SYSTEM

Locomotives that are not actually needed to power an empty train, may be assigned to a loaded train headed for the same terminal. Thus, each empty or loaded train may not always move with five locomotives as planned. However, a loaded train would always have at least five locomotives and an empty train would have at least three.

Locomotives for each train would be assigned from a Coal Power Pool. This pool consisted of 49 locomotives on March 1, 1978. Additional locomotives would be purchased as they are needed. If for some reason there were not a sufficient number of locomotives available, regular freight locomotives would be used.

During 1977, BN's coal-assigned locomotives traveled an average of approximately 91,800 miles each. In planning locomotive requirements, BN is currently projecting an average locomotive will travel 110,000 miles per year. Coal locomotives are different from the average general purpose locomotive. Because of the heavier loads involved, BN's coal locomotives are higher horsepower locomotives than average. They have six axles rather than four to reduce slippage and improve handling ability on hills. They also are heavier in order to achieve better traction. They are equipped with a pace setter control built into the unit which allows operation at constant slow speeds of 0.4 to 1.1 mph to permit loading the coal cars under the loading chutes. Pace setters serve no purpose on regular freight locomotives.

For the planned operation, 30 percent spare locomotives in addition to those needed for in-train service would be required to allow for inspection and maintenance, and to provide stand-by replacement capability to assure virtually continuous service by the trains. Presently, BN's coal-assigned locomotives are in a train approximately 55 percent of each day, and are undergoing inspection, maintenance and repair or are in a stand-by condition 45 percent of each day. BN expects to reduce the present 45 percent margin to 30 percent as the planned investment in plant capacity is accomplished.

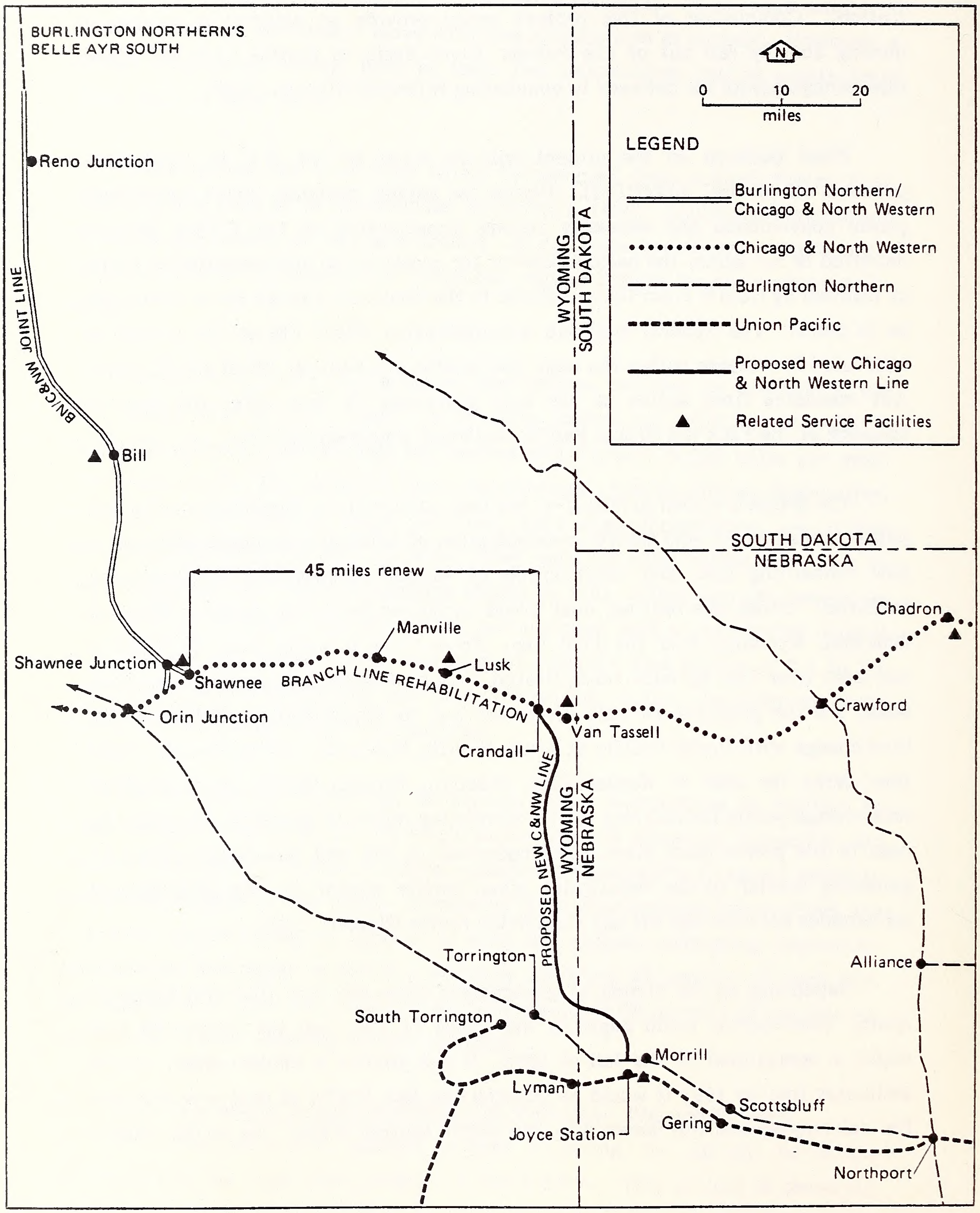
II.7 Interrelationship of Alternative Action with Other Planned Projects

The most important planned project affecting the all-rail no-action alternative is the Coal Line Project of the C&NW. This project is presently before the Interstate Commerce Commission for various approvals, and an application for guaranteed loans is pending before the Federal Railroad Administration. Completion of this project would provide an alternative means of moving coal by rail out of the Powder River Basin to Kansas City and other interchange points for delivery to connecting railroads (Nesbitt 1980).

Final decision on the project will be made by the ICC in April 1981 pursuant to 49 USC 10327(f)(2). Unless the earlier decision, which found that public convenience and necessity require construction of the C&NW line, is modified or set aside, the basic authority for construction and operation of a line of railroad by C&NW from Union Pacific to the Southern Powder River Basin will be in place. The Federal Railroad Administration (FRA) EIS on the project is scheduled for release within the next few months and Section 702 of the Staggers Act mandates final action on the loan guarantee 75 days after the date of issuance of the FRA EIS (Union Pacific Railroad, comment 137-3).

The project, shown in Map II-4, has four components: construction of a line jointly owned by BN and C&NW, rehabilitation of existing line, construction of a new connecting line, and construction of various maintenance and operating facilities. Under this routing, coal would be moved from the mines to Shawnee Junction, Wyoming, over the joint line. From there it would move to Shawnee and east over the 45-mile rehabilitated line to Crandall, Wyoming, and then south via the proposed 56-mile connector line to Joyce Station, Nebraska, for interchange with Union Pacific at South Morrill, Nebraska. Union Pacific would then carry the coal to Kansas City, Missouri, Council Bluffs, Iowa, or other interchange points for delivery to the connecting railroads which would carry the coal to the power plant sites. The operation of the unit coal trains would be generally similar to the description given earlier except for the geographical differences between the BN and C&NW-UP routes (Nesbitt 1980).

Depending on the timing of government approvals and financial arrangements, construction could begin in the spring of 1981 and the C&NW-UP line could be operational by the fall of 1982. If the project is implemented, C&NW estimates that by 1991 it would be transporting 40.3 MMTA of coal over this line for delivery to utilities located in the north central states, the south central



Map II-4. CHICAGO & NORTH WESTERN COAL LINE PROJECT states, Texas, and possibly Florida (Nesbitt 1980). Completion of this project would provide an alternative and competitive means of moving coal by rail out of the Powder River Basin to Kansas City and other interchange points for delivery to connecting railroads (Nesbitt 1980). Because the project's future is still uncertain and subject to funding approval, it is not included in the analysis of impacts for the identified no-action, rail alternative. For the route-specific impacts the reader is referred to the relevant EIS (U.S. DOT 1980).

III. SOCIOECONOMIC IMPACTS

This section presents the analysis of the impacts that would be associated with the movement of 37.4 MMTA of coal. Specific issues addressed are employment, rail related accidents, community disruption, and taxes. Before discussing these the affected population is identified and the existing environment is described.

III.1 Affected Population

The major towns that would be traversed by the several railroad routes used in the delivery of the 37.4 MMTA of coal to the utilities of the Midsouth are listed in Tables A-1 through A-10 in Appendix A, along with the most recent population figures. The number of trains per day that this movement would mean for each route segment is given in Table I-1. It is estimated that the BN would pass through approximately 100 towns enroute from the mines in Wyoming to the interchange point in Kansas City. This would be the most heavily traveled portion of the route and the portion along which the highest speeds would be maintained. South of Kansas City, as many as 500 towns would be affected as coal moved to the most distant market in Lake Charles, Louisiana. This portion of the route is less heavily traveled and train speeds are generally lower as the trains, particularly those maintained by MP, would stop frequently for crew changes and pull-by inspections.

Between the coal mines and Kansas City, a minimum of 800,000 people live in towns that would be traversed by BN. Another 59,000 would be affected by the route to Pryor, the shortest distance traveled; 400,000 would be affected by the route to Lake Charles, the longest distance traveled.

The impacts to these towns and cities from the increased rail traffic would be immediate, lasting, and in some cases positive and others negative. Positive impacts would occur in cities like Alliance and Ravenna, which would benefit from new rail maintenance facilities and increased employment. Negative impacts would include increased rail related accidents, greater vehicular delay (especially in small towns) and a potential reduction in certain services (PMM

1979b, II-48). These impacts are discussed in Sections III.3, III.4 and III.5, which follow.

III.2 Existing Environment

The number of communities potentially affected by rail traffic to the nine markets of the ETSI proposed action is so large that each cannot be described here. Instead, nine representative communities along the BN route and five towns along the southern route are described.

Torrington, Wyoming. Torrington is bisected by the BN, with about 85 percent of the population located north of the BN tracks and 15 percent located south of the tracks. All services, including the schools, are north of the tracks. No satellite fire, police or ambulance facilities are located south of the tracks. Located within 500 feet of the center line are a church, the library, and one home for juveniles. The general feeling in the town about the potential increased BN traffic is negative. These negative attitudes are due to increased traffic and existing traffic congestion, which includes delays, accidents and service disruption at the grade crossings. These problems are magnified by the fact that the town will receive no economic benefit from the increased traffic (PMM 1979b).

Scottsbluff, Nebraska. Scottsbluff (population 12,700) is another city that is bisected by the BN. Approximately 20 percent of the population lives south of the tracks and 80 percent lives north of the tracks where the major services are located. Peat, Marwick, Mitchell & Co. (1979b) made the following observations:

> Police, fire and ambulance services report that the risk of delay is greatest for ambulance services or health emergencies. Valley Ambulance Service crossed over the railroad tracks on 443 calls out of the 1400 runs made during 1977. Less than 1/4 of fire department responses within the City involve crossing any tracks although more than a third of rural station runs cross over tracks. The police department has a beat on the south side of the railroad so they experience fewer problems with blocked crossings.
>
> Active fire rig responses to calls across the tracks have not been caused by or related to railroad operations. Railroad tank cars on service sidings do not contain highly volatile matter and present no great fire hazard to the area. Propane tank cars are stored out of town and other combustible or toxic shipments have not yet been a problem.

> The rail corridor and blocked crossings present problems for the pedestrians that are different from those facing the motorist. The dangers of violating common-sense safety crossing rules are not always comprehended and not understood by all of the more than 250 school children who cross the tracks on foot each day.
>
> Approximately 350 senior citizens living on the south side of the corridor also are exposed to the hazard of increased rail traffic as they cross the tracks to keep appointments at medical institutions, to visit the activity center or the library located in the north half of the city, to go shopping, or to participate in religious or social functions which often occur on the opposite side of the tracks.
>
> Employment areas are severed from high minority populated neighborhoods by the mainline tracks and yard facilities. This separation requires frequent traversing of the corridor by an employment group which does not have the advantage of alternate work opportunities.

The Chamber of Commerce has been advocating a grade-separated crossing for several years.

Directly affected facilities within six blocks of the BN include one church, two schools, and the public library.

Alliance, Nebraska. The BN skirts the west and south sides of Alliance (population 7000). Industrial development south of the tracks is primarily on BN property and the residential development west of the tracks can be served by the U.S. 385 overpass. According to the Alliance Chamber of Commerce, the impacts from increased coal traffic on the BN would not be considered a community problem (PMM 1979b).

Between 1970 and 1977, construction-related expenditures by BN increased from $162,000 to $16.7 million with the completion of the $47-million repair shop that is next to BN's yard in downtown Alliance. The company's local payroll has increased to $40 million a year and the population has increased from 7,000 to 10,000; 2000 of these are employed by BN (Fortune 1980).

While increased railroad development is not likely to be opposed in Alliance as it is in other towns, Alliance is experiencing something of its own boomtown problems. For example, despite a dramatic increase in housing construction (only two houses were built in 1970 versus 92 apartment units and 129 houses in 1979) the town has not kept up in terms of any accompanying growth in private services.

Broken Bow, Nebraska. The BN bisects Broken Bow (population 4000) about equally. According to one of the Broken Bow citizens, grade separations are a major issue with most citizens. All emergency services are south of the tracks, which means that about 50 percent of the population could be cut off from the services by the passage of a train because there are no grade-separated rail-highway crossings (PMM 1979b).

Ravenna, Nebraska. Ravenna (population 1300) is a major crew-change town for the BN. Many fast food restaurants derive significant income from the 48 BN living units. No quiet facilities are within 1000 feet of the BN right-of-way and most are beyond 2000 feet. Services are not a major problem, except for the BN crew-change quarters, which are south of the tracks (PMM 1979b).

Grand Island, Nebraska. According to local officials, facilities in Grand Island (population 33,000) that would be affected by increased BN traffic include two schools, a veterans' home, a hospital, a church, and a recreation park/little league ball field. Most of the city is south of the tracks, with the older part of the city north of the tracks. The BN traffic is considered well scheduled, with particular attention paid to scheduling of traffic to avoid blocking grade crossings (PMM 1979b).

Lincoln, Nebraska. "The impacts of increased coal traffic in the Lincoln area (population 163,000) are likely to be perceived as a major problem, as evidenced by numerous newspaper articles on this subject and by at least one major environmental impact statement (1977) and a more recent (1978) supplement to it." (PMM 1979b.)

Particular concern has focused on the more than 400 at-grade rail crossings in the town and the relatively high accident rate that has been experienced at these crossings. While the town can trace much of its development to the presence of the railroads, some of which date from the late 1800s, current urban development has resulted in problems that the citizens of Lincoln are actively trying to have remedied (U.S. DOT 1979b). A more detailed discussion of the particular problems in Lincoln appears in Section III.4, Rail-Related Accidents (U.S. DOT 1977b).

Greenwood, Nebraska. Greenwood (population 500), in contrast to some other towns, may be more heavily affected by increased rail traffic. Approximately 60 percent of the population lives northwest of the tracks, while the other 40 percent lives to the southeast. Since all rail highway crossings are at grade this 40 percent of the population could be cut off from fire, ambulance, and police services by the passage of a train. Children from 60 percent of the population must cross the tracks to reach school. The nearest hospital is to the east, so 60 percent of the population could be cut off from the hospital as well (PMM 1979b).

The city's future plans will further diminish fire service accessibility because the city has purchased land for a new fire station to be located southeast of the tracks. Most of the fire volunteers, however, live northeast of the tracks, which could exacerbate the problem (PMM 1979b).

Kansas City, Missouri. Kansas City, Missouri, has a population of 473,000 and is served by 12 railroads that average 272 freight train trips daily. These railroads are: Chicago and North Western, St. Louis—San Francisco, Illinois Central Gulf, Kansas City Southern, Milwaukee Road, Missouri-Kansas-Texas, Missouri Pacific, Rock Island, Santa Fe, Union Pacific, Norfolk and Western, and Burlington Northern (Missouri Division of Employment Security 1979).

Vehicle delay due to at-grade crossings should not be a problem in Kansas City. The city has a hilly topography so most of the crossings are grade-separated. There are, however, two crossings where problems with regard to emergency services could develop. One crossing is in the southern part of the city where State Highway 150 crosses the Kansas City Southern tracks. The second crossing is where Jackson County route 10S crosses the MP tracks. There is a fire station within one-half mile of the crossing and the alternate grade-separated crossings are more than a mile to the north (I-435) and south (Blue Ridge Blvd.), both of which are considerably out of the way (Carroll 1980).

Pryor, Oklahoma. Pryor (population 7800) has 3,000 people employed in 47 manufacturing companies, most of which are located just south of the city in a 10,000 acre industrial park. The MK&T stops and picks up freight two hours per day. The railroad is located on the western fringes of the city, paralleling U.S. Highway 69. The majority of residential area and all of the city's services are located east of the railroad tracks. The police, fire and sheriff's offices are located within one block of the tracks (Oklahoma Community Data Sheet for Pryor 1979).

Muskogee, Oklahoma. Muskogee (population 37,313) has 690 retail establishments employing 3,216 people and 150 wholesale establishments employing 625 people. The city's 15 largest manufacturing companies employ an additional 3,200 people (Oklahoma Gas and Electric Co. 1979).

Muskogee is served by three railroads: Missouri-Kansas-Texas Railroad, Missouri Pacific (Texas Pacific) Railroad Company, and St. Louis-San Francisco Railway Company. Each railroad has two trains per day which stop and pick up freight.

The MK&T traverses the city in a general north-south direction and among the three railroads has the greatest effect on vehicular movement. Located on the east side of the railroad are the major residential and industrial areas. On the west side of the railroad are located the major commercial areas and public emergency facilities. "The railroad has become a major physical barrier to traffic flows in an east-west direction. There are only five at-grade crossings and one grade-separated crossing (constructed in 1913) serving the major development" (Muskogee Metropolitan Area Planning Department 1977).

Several major tracks through the city are owned by MoPac. One parallels the MK&T through the major portion of the city and then branches off to the west. Another MoPac line runs through the eastern part of the city, and a third

MoPac line runs through the northern portion of Muskogee, bypassing much of the city.

Newport, Arkansas. Newport (population 7900) has 2650 people employed in manufacturing industries and 1350 people employed in agriculture. The city serves as a maintenance/crew change stop for the MP. The railroad passes through the northwestern part of town and continues south along Front Street directly across from the White River (Arkansas State Highway Department undated). The police and fire department as well as the public library and a hospital are located one block from Front Street. These facilities would be affected by additional rail and coal trains (Arkansas Department of Local Services 1977).

Dumas, Arkansas. Dumas (population approximately 6000) has about 2000 people employed in eight manufacturing industries including wood products and small appliances. Dumas is passed through by the MP. The MP parallels Main Street and divides the town into east and west portions (Arkansas State Highway Department 1975). Most of the residential areas along with the health facilities are located on the west side of town. All other services are located on the east side of town. Directly affected facilities within four blocks of the MP include schools, three churches, the public library, and the Desha County Hospital (Arkansas Department of Local Services 1977).

III.3 Employment

One of the questions more frequently raised in discussing the merits of transporting coal via slurry pipeline versus railroad concerns the effects of the proposed pipeline on railroad employment. Newspaper and journal articles have included comparisons such as the following:

> Another related negative impact of coal slurry pipeline development would be loss of job opportunity for thousands of railroad workers. Pipelines are much less labor-intensive than railroads, requiring considerably fewer employees to operate the system. (Lorentzsen 1978)
>
> The ETSI will employ 335 people, whereas a comparable railroad would employ about 2570. (C&EN 1977)

Considering not just operation of the two modes of transportation, other articles have noted the number of jobs that would be created by pipeline construction. Specifically:

> Some labor unions support the [eminent domain] legislation, noting the thousands of jobs that would be created during pipeline construction. Construction of the proposed 2300-mile Energy Transportation Systems Inc. (ETSI) pipeline from the Gillette Mine in Wyoming to White Bluff, Ark., and Baton Rouge, La., is expected to create nearly 7,000 jobs. (Sarasohn 1980)
>
> Pipelines employ less labor than does rail over their useful lives, but if a substantial pipelines industry were to develop, enough people would be likely to be employed in construction and supplying industries to offset cumulative employment impacts in the rail industry for the rest of the century. (OTA 1978a, p.4)

Embedded in these statements is concern over several aspects of employment. These can be summarized as follows.

- A long-term loss of jobs in the railroad industry caused by diversion of coal freight from the railroads to the slurry pipeline.
- A long-term economy-wide decrease in the number of jobs available due to the less labor-intensive operation of the pipeline.
- A short-term increase in construction jobs.

Our focus will be principally on the long-term effects of the pipeline on railroad employment. The short-term effects of pipeline development have been adequately summarized as follows:

> If...the public concern is...with the immediate provision of jobs, then billion-dollar pipeline projects, which will be financed entirely with private funds, have an obvious...attraction. (Banks 1977)

Quite reasonably, most public concern is directed toward the long-term, 30-year effects on employment. Before trying to make estimates of the potential number of railroad workers so affected, we quote Banks' assessment of the issue:

> In terms of relative employment between the pipeline and the railroad, there are different opinions as to the magnitudes of the two labor forces to accomplish the equivalent movement of coal. However, both sides agree that the railroad labor force is three to four times greater than that of the

> pipeline. As a long-term provider of jobs, the railroad far excels the pipeline. Quite naturally, this argument is advanced by the railroad labor unions in opposing the pipeline.
>
> The pipeline proponents' rejoinder is that if the pipeline is the cheapest mode of transport, then a refusal to build it in order to keep people working at unnecessary and obsolete jobs is nothing more than a variation on the ancient theme of featherbedding.

Summarizing the controversy, Banks notes the circularity of the argument that may evolve:

> If eminent domain power is granted to the pipeline because it is in the national interest to do so;
>
> And if it is in the national interest because the pipeline moves the coal at lesser cost than the railroads;
>
> And if the pipeline costs less because it eliminates several thousand jobs;
>
> And if there are no other suitable jobs available for those displaced people;
>
> And if the nation is committed to supporting the fraction of those people who are thus rendered unemployed;
>
> Then it could be argued that the cost of that public support should be deducted from the gross cost savings of the pipeline before the construction of the pipeline can be declared to be in the national interest.

In addressing the question of employment lost due to the pipeline, care must be taken to differentiate between the loss of a current job versus the loss of a future job, i.e., one that does not now exist. Both seem to be relevant.

Concerning the first case, it is assumed that loss of an existing job ocurs only if the railroad, for example, carries less traffic next year than it did this year. This seems most unlikely. All projections of future rail traffic show steady and sometimes dramatic increases in traffic over the next ten years. In testimony on the Coal Pipeline Act of 1977, KCS president Thomas Carter noted the following (U.S. Congress 1977, p. 421):

> In 1976, KCS moved 333,000 tons of coal over its system. Unit coal trains this year (1977) will carry 3,400,000 tons. By 1980 KCS expects 7,000,000 tons and by 1984 8,750,000 tons.

Similarly, BN carried 78 million tons of coal in 1979 and has a target of 130 million tons annually (Business Week 1979). Hence, it seems clear that we are not talking about jobs that will be lost due to a decrease in traffic.

What is being argued then by the railroads is a loss of future jobs, principally because the railroads would first serve the proposed ETSI markets as the power plants come on line starting in 1980, and then lose this traffic when the pipeline is completed in 1985. The railroad argument was summarized in the hearings by L.W. Menk, Chief Executive Officer of BN, as follows (U.S. Congress 1977, p. 339):

> Unfortunately, these employement questions have largely been viewed in terms of employment opportunities rather than as concerning actual job losses. This is a mistake.
>
> If slurry lines are built, they will serve utilities which will gradually build up their coal receipts over a period of years in reliance on rail hauled coal. During this start-up period the training and employment of many new railroad people would be required for a relatively short period. They would, however, unavoidably lose their jobs when the shift to pipeline was made. I suggest that the number of persons affected by one pipeline might be about 2000.

This argument is valid if it can be shown that the ETSI coal traffic would not be replaced by other traffic. This is virtualy impossible to do but we would argue that the projections for coal traffic indicate that introduction of the pipeline would just slow the growth in rail traffic, not cause an absolute decline either in the present or future. Farris and Shrock (1978), in their analysis of the economics of slurry transport of coal, note:

> ...The adoption of slurry pipeline technology for the movement of western coal does not mean that the railroads will lose business, only that the increase in potential business resulting from the added U.S. dependence on coal as an energy source will be lessened.

Loss of jobs in the future would be anticipated only if rail traffic increased up through 1985, for instance, and then fell back sharply because of pipeline start-up. All available figures indicate that for the system as a whole this would not be likely; railroads will be transporting no less coal after 1985 when the coal slurry pipeline is scheduled to come on-line than they are currently transporting (1980).

The total amount of coal to be transported from the Powder River Basin region will be a function of demand for that coal, and the coal capacity of the systems designed to transport it. In order for the railroads to be worse off, they will necessarily have to be transporting less coal than their present (1980) level; in order for the railroads to be transporting less coal, the portion of coal shipped via pipeline must be large enough so that, when subtracted from the total demand for Powder River Basin coal, the remaining tonnage falls below the amount currently shipped by rail. This, however, is not the case.

Table III-1 indicates two different estimates for future demand for Powder River Basin coal.

TABLE III-1

FUTURE DEMAND FOR POWDER RIVER BASIN COAL: 2 ESTIMATES

	1980	1985	1990
Teknekron	109.4 MMTA	181.9 MMTA	225.2 MMTA
U.S. D.O.I	--	140.4*	173.7*

*The government report presented a range of demand estimates: Low, Medium, and High. These figures are the Low estimates.

For 1985, demand is estimated at 181.9 MMT and 140.4 MMT (Table A). For this calculation we will use the more conservative estimate of 140.4 MMT. The ETSI pipeline will have a load capacity of 37.4 MMTA. Subtracting this from total demand, we get: 140.4 MMT - 37.4 MMT = 103.0 MMT net demand. The question is whether this amount of coal to be shipped by rail is above or below the current level.

For purposes of making the most conservative estimate, current coal tonnage transported will be calculated at capacity operating levels. The capacity of the specified BN route is taken as 15 to 20 unit trains per day (U.S. DOT 1979a). One unit train consists of 100 cars carrying 100 tons each. Thus each train carries 10,000 tons; half of the 20 trains daily account for empty backhauls. Thus 10 loaded trains daily carry 100,000 tons, or 36.5 million tons annually. Clearly, 103.0 MMTA, the net demand for coal after the pipeline, is greater than 36.5 MMTA, the 1980 BN route capacity. Consequently, it follows that the railroads should not be transporting less coal in 1985 than they are presently. The figures reflect this same finding for the year 1990.

Another possibility, however, would be a shift in rail routes used due to changes in destinations of traffic. This would not occur along the northern route, as this is used exclusively by BN. Where such a problem might arise is in the South, as coal deliveries would be diverted from Muskogee, White Bluff, and other Midsouth markets to other utilities. If the new markets use different lines, then there would be some line-specific unemployment. This is not considered a problem for several reasons. The four lines serving the Midsouth markets cover wide areas of the southeastern United States, and it is quite likely that in shifting from one utility to another, the same railroad, but a different one of its routes, would be used. Even if there was shifting from one line to another, it could be expected that railroad workers would shift from the line with relative overemployment to the line with relative underemployment. As railroad workers are widely dispersed and relatively mobile, it is not anticipated that such shifts, if necessary, would cause great problems for the individual workers.

While it has been argued that no loss of rail employment would occur due to the pipeline, it is still useful to estimate how many people would be involved in the movement of 37.4 MMTA, as a means of assessing the socioeconomic impacts that might be anticipated from the no-action alternative. Before doing this, it should be noted that there are several employment-related conditions within the rail industry today that complicate such an estimate. For one, the railroads have been experiencing increasing productivity, due partly to the use of the unit train. Hence increased traffic, such as the carrying of 37.4 MMTA of coal, might not result in significant employment increases, since some of the increased traffic would be handled by current employees through increases in productivity. Second, some railroads, BN in particular, are experiencing problems of overemployment. Winston Williams (1978), in an analysis of BN, quotes its president:

> Mr. Lorentzsen insisted that a key to his profit plan was making the railroad "slimmer and trimmer," meaning abandoning excess and redundant track and reducing the work force. Overemployment is a bigger problem at Burlington than at most railroads because in 1970 the merged railroad agreed, as a price for labor peace and to help expedite the merger proceedings, to reduce employment only through attrition.

This suggests that gains in future traffic will again be handled by existing workers; that current conditions of overemployment will reduce the actual number of new workers that would be needed to handle an increase of 37.4 MMTA. What this means is that these will be estimates of the numbers of people who would be involved in the future movement of 37.4 MMTA, not actual figures of the numbers of people now so employed. It cannot be said that if the railroads do not ship this coal this many people will lose their jobs, nor can it be said that if the railroads do ship this coal many new jobs will result. Productivity changes and existing overemployment, as well as the use of railroad planning factors, make these estimates just that, estimates. They must be used cautiously.

To give some idea of the magnitude of employment that could be associated with the proposed shipment, the five railroads were asked to provide breakdowns giving the number of crews, number of and reasons for train stops, and numbers of people involved in each operation-related activity. These numbers are given in Appendix B. On the basis of these inputs, summarized in Table II-7, the railroad figures indicate that it would take 50 trains annually to deliver 37.4 MMTA of coal to the Midsouth utilities. In total, approximately 2500 people would be involved in the direct movement and operation of the train. Not included are the maintenance base personnel in Kansas City and Alliance. As Table II-7 indicates, the largest component of the rail operating employment is the rail crew. Of the total employment of approximately 2500, more than 90 percent is devoted to crew, and yet it is crew composition and crew responsibilities that are most susceptible to increasing efficiencies with unit train operation.

Estimates of total coal related employment, including operations personnel, maintenance, and clerical support, are derived using two different approaches. The one is based on nationwide rail experience and represents an upper bound, as it includes short-haul and general merchandise freight. Statistics indicate that there are 1.96 rail employees per track mile (Chesser 1976). Use of that factor and an estimate of 3600 track miles (see Table III-2) gives a total employment estimate of 7100.

An alternative means of estimating total employment is to use BN's planning factor of 8 ton miles of coal per year per employee (Boyce 1980b). On the basis of this factor and an estimated 46,270 annual ton miles (Table III-3), total employment would equal 5784. The greatest concentration of these people would be in Alliance and Lincoln, Nebraska, and Kansas City, Missouri.

Socioeconomic impacts related to this employment would be experienced in those towns where there are major maintenance facilities or where the train stops for a crew change or inspection of one sort or another. The former are found principally in Alliance, Nebraska, for BN, and in Kansas City for the other four railroads. Both of these are sizeable cities and are discussed in detail in Section III.2.

Table III-4 lists the towns that are used as crew change sites or inspection points. Except for the 500-mile brake test, these activities require less than one-half hour to complete. As Table III-4 shows, these activities occur in towns of all sizes; some are as small as a few hundred people (Bergman, Missouri), while others are relatively large cities (North Little Rock, Arkansas). To analyze the potential socioeconomic impact on these towns, the following was assumed:

- Maintenance crews live in the towns where the inspection stops are made or where the maintenance facilities are located.
- Operating crews may or may not live in the town where the crew change occurs.

TABLE III-2

DERIVATION OF TRACK MILES

Route Segment	One-Way Distance (miles)	Route-Specific Track (miles)
Wyoming - Kansas City	730	730
Kansas City - Pryor	204	204
Kansas City - Ponca City	269	269
Kansas City - Muskogee	253	same as White Bluff
Kansas City - White Bluff	530	same as Boyce
Kansas City - Independence	407	407
Kansas City - Boyce	829	108
Kansas City - Lake Charles	744	183
Kansas City - New Roads	848	848
Kansas City - Wilton	823	823
		3572

Source: Distances per Williams 1980 based on the Official Guide of the Railways of the United States (National Railway Publishing Co., various dates) and the Rand McNally Railroad Atlas (Rand McNally and Co., 1978). These mileages vary slightly from those provided by the railroads but reflect the shortest distances and not the several routes available at certain junctions which can produce a longer point to point distance.

TABLE III-3

ANNUAL TON-MILES

Route Segment	One Way Distance (miles)	Tons (millions)	Ton-Miles (millions)
Wyoming - Kansas City	813	37.4	30,406
Kansas City - Pryor	225	3.0	675
Kansas City - Ponca City	287	6.6	1,894
Kansas City - Muskogee	308	5.0	1,540
Kansas City - White Bluff	552	5.0	2,760
Kansas City - Independence	404	5.0	2,020
Kansas City - Boyce	838	1.8	1,508
Kansas City - Lake Charles	761	4.0	3,044
Kansas City - New Roads	911	2.0	1,822
Kansas City - Wilton	823	5.0	4,115
			49,785

TABLE III-4
CREW CHANGES AND MAINTENANCE STOPS FOR THE ROUTES OF THE PROPOSED ACTION

Railroad	State	County/Parish	Town	Population
BN	Wyoming	Platte	Guernsey (2)	838
	Nebraska	Box Butte	Alliance (1,2)	6,990
		Buffalo	Ravenna (2)	1,250
		Lancaster	Lincoln (1,2)	163,112
	Missouri	Buchanan	St. Joseph (2)	77,679
		Jackson	Kansas City (1,2)	472,529
MP	Kansas	Miami	Osawatomie (1,2)	4,156
			Dixon (1)	NA
		Montgomery	Coffeyville (1,2)	15,537
	Oklahoma	Rogers	Claremore (1)	9,897
			Cookson (1)	NA
			Upson (1)	NA
	Arkansas	Crawford	Van Buren (1,2)	9,452
		Franklin	Alix (1)	NA
		Conway	Morrilton (1)	6,814
		Pulaski	North Little Rock (1,2)	61,768
		Jefferson	Pine Bluff (1)	57,389
		Desha	McGehee (1,2)	5,413
			Sunshine (1)	NA
	Louisiana	Morehouse	Collinston (1)	428
		Ouachita	Monroe (1,2)	61,016
		Caldwell	Grayson (1)	601
		Grant	Georgetown (1)	305
			Texmo Junction (1)	NA
		Rapides	Alexandria (2)	NA
		Rapides	Meeker (1)	NA
		Avoyelles	Bunkie (1)	5,129
	Missouri	Cass	Pleasant Hill (1)	3,475
		Cass	Ore (1)	NA
		Bates	Rich Hill (1)	1,590
		Vernon	Sheldon (1)	483
		Barton	Lamar (1)	3,791
		Jasper	Carthage (2)	10,928
		Stone	Crane (1)	1,108
	Arkansas	Taney	Branson (1)	2,642
		Boone	Bergman (1)	294
		Baxter	Cotter (1,2)	949
		Izard	Calico Rock (1)	928
		Independence	Batesville (1)	7,209
KCS	Kansas	Crawford	Pittsburg (2)	18,375
	Oklahoma	Adair	Watts (2)	346
		LeFlore	Heavener (1,2)	2,585
	Arkansas	Sevier	DeQueen (2)	4,083

TABLE III-4 Concluded

Railroad	State	County	Town	Population
KCS	Louisiana	Caddo	Shreveport (1,2)	185,711
		Vernon	Leesville (2)	8,473
		Calcasieu	Lake Charles (1)	76,087
		Rapides	Alexandria (2)	49,481
		Baton Rouge	Baton Rouge (2)	444,600
ATSF	Kansas	Lyon	Emporia (2)	23,447
		Cowley	Arkansas City (1,2)	13,791
MKT	Kansas	LaBette	Parsons (1,2)	12,356

Source: Population data are from U.S. Bureau of the Census 1977.

Notes: 1 = Inspection or maintenance stop. 2 = Crew change. For numbers of people involved in each activity for each railroad, see Table II-7.

Justification for this second assumption is found in the following: A crew change occurs at the mine site in Wyoming, but the crew is driven out from Gillette. Similarly in Mossville, Louisiana, the crew is driven to the site. Further, BN, while making a crew change in Ravenna, Nebraska, does not list this as a crew terminal. Instead, crew terminals, or basing cities, are Edgemont, South Dakota, Alliance and Lincoln, Nebraska, and St. Joseph, Missouri (Boyce 1980c).

While many of the towns listed as stops for inspection are small, the numbers of people involved in these activities are also small (Table III-4) — one person for a pull-by inspection, which is also sometimes done by the crew, and four people for a 500-mile brake test. Hence, despite the relatively small size of the towns indicated as inspection stops, it is not expected that the addition of inspection/maintenance personnel would cause measurable socioeconomic impacts. Crew change cities are larger. If it is assumed that all crews were to locate in these cities, and it can be expected that they would not, their increased numbers would again be so small as to create no measurable socioeconomic impacts.

III.4 Rail-Related Accidents

Another question that has been raised concerning the no-action alternative concerns rail-related accidents. The expectation is that increased train traffic and/or higher average train speeds would result in an increased rate of rail-related accidents.

Substantial research has been devoted to the development of rail hazard indexes and equations for predicting the expected number of accidents. There is general agreement that vehicle and train volumes are the two most important predictive factors. It is also the case that there are almost as many predictive equations as there are groups that have attempted to address the problem. For a review of research done in this area, see Schoppert and Hoyt (1968, Appendix A). Among the reasons for the diversity in equations and relative importance attached to such factors as visibility, road condition, and crossing protection is the difficulty of collecting good data. What data have been collected, however, give some indication of the rail accident problem. Some of the more important results are the following:

- Accidents at railroad crossings account for less than 0.1 percent of all motor vehicle accidents; however, approximately 2.5 percent of all motor vehicle deaths have occurred at railroad crossings.
- Many accidents which occur at railroad crossings do not involve trains; train accidents are actually rather infrequent.
- In a sample of 3627 accidents that occurred at railroad crossings, those involving trains accounted for only about one-third.
- On the average, there is one traffic accident per railroad crossing every 22 years and one accident per crossing involving a train every 69 years.
- Approximately two-thirds of all train accidents have resulted from the train hitting the vehicle; one-third from the vehicle striking the train.
- The most important predictors of accidents are vehicle and train volumes, type of protection, and characteristics of urban and rural areas.
- As train speeds increase, the percentage of vehicles striking trains decreases, and with it the greater source of train-related deaths.

After a comprehensive review of the literature and data concerning rail-related accidents, Schoppert and Hoyt developed the following model for predicting train-involved rail accidents (non-train rail accidents can be ignored as they would occur with or without the no-action alternative).

$$\text{EA per year} = A \times B \times \text{trains per day}$$

where EA is the expected number of accidents per year, A is a factor based on vehicle volume, and B is a factor which accounts for an urban versus rural location as well as the type of crossing protection. These factors are given in Tables III-5 and III-6. The following calculations illustrate the impact of increased train traffic on the accident rate:

Case 1. Assume an urban area with cross buck protection, 5000 vehicles per day and 10 trains per day. The expected number of accidents per year is 0.2, or two accidents every ten years.

TABLE III-5

A FACTORS

Vehicles Per Day	'A' Factor
250	.000347
500	.000694
1000	.001377
2000	.002627
3000	.003981
4000	.005208
5000	.006516
6000	.007720
7000	.009005
8000	.010278
9000	.011435
10000	.012674
12000	.015012
14000	.017315
16000	.019549
18000	.021736
20000	.023877
25000	.029051
30000	.034757

Source: Schoppert and Hoyt 1968.

TABLE III-6

B FACTORS

	Basic Values	
A =	Cross bucks, highway volume less than 500 per day.	3.06
B =	Cross bucks, urban.	3.06
C =	Cross bucks, rural.	3.03
D =	Stop signs, highway volume less than 500 per day.	4.51
E =	Stop signs.	1.15
F =	Wigwags.	0.61
G =	Flashing lights, urban	0.32
H =	Flashing lights, rural.	0.93
I =	Gates, urban.	0.32
J =	Gates, rural.	0.19

Source: Schoppert and Hoyt 1968.

EA = .006516 x 3.06 x 10 = .1994

If the number of trains per day increases to 20 the rate is doubled.

Case 2. Assume a rural area, again with cross buck protection, 1000 vehicles per day and ten trains per day. The expected number of accidents per year is 0.05, or five accidents every 100 years.

EA = .001377 x 3.89 x 10 = .0536

If the number of trains per day increases to 20, the rate is 0.11.

The no-action alternative would result in an estimated 20 trains per day over the most heavily traveled portion.[a] Obviously this number decreases as the trains move south, particularly after the interchange with other lines. As the above figures indicate, the increase of 20 trains a day at most, would not increase accident rates to even a level of one per year per crossing.

Prediction of the total number of accidents across a railroad route like the one in question is a complicated matter by virtue of the wide range of variables encountered over the segment. While several models are useful in predicting accidents at a particular site or grade crossing (e.g., Schopper-Hoyt model), it becomes a difficult task to extrapolate these results over a greater distance.

A conservative approach to accident prediction is estimation based on actual railroad safety records. Table III-7 gives grade crossing accident statistics for all U.S. railroads, 1977 through 1979.

It is important to note that "Fatal Accidents" represents the number of accident events in which there was at least one fatality. "Nonfatal Accidents"

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[a] Over the most heavily traveled portion of the route, from Wyoming to Kansas City, the total tonnage carried is 37.4 MMTA. Using the OTA factor of approximately 1 ton annually, resulting in 2 trains per week, it is calculated that the movement of 37.4 MMTA would result in an increase of about 11 trains per day. Harter Williams (1980) calculates approximately 16 trains per day. The PMM (1979b) factor used earlier yields 20 trains per day.

TABLE III-7

ACCIDENTS AND CASUALTIES AT GRADE CROSSINGS: 1977-1979

Year	Total Train Miles	Total Grade Crossing Accidents[a]	Fatal Accidents	Total Fatalities[b]	Nonfatal Accidents	Total Nonfatal Casualties[c]
1977	750,042,291	4,112	734	929	3,378	4,329
1978	751,964,265	3,814	813	998	3,001	3,915
1979	763,428,674	3,633	672	814	2,854	3,856
TOTAL	2,265,435,230	11,559	2,219	2,741	9,233	12,100

Source: U.S. DOT 1978, 1979b, 1980b

[a] The term "accidents" here refers to the sum of "Accidents" and "Incidents" as defined by the Department of Transportation. The distinction lies in dollar damage to railroad equipment, track, or roadbed:
An "accident" results in such damage over $2,300.00
An "incident" results in such damage under $2,300.00

[b] Does not include RR employees or passengers.

[c] Does not include RR employees or passengers.

[d] The term "accidents" refers to the sum of "Accidents" and "Incidents" throughout this discussion (See footnote 1)

represents the remaining accident events, in which there were several, one, or zero non-fatal casualties.

The total number of train miles, accidents, fatalities, and casualties was summed for the three year period. From these sums, the following accident rate and casualty rates can be calculated, based on a three year performance record:

- 11,559 Total Grade Crossing Accidents/2,265,435,230 Train Miles = 5.10 Grade Crossing Accidents/Million Train Miles
- 12,100 Total Non-Fatal Casualties/2,265,435,230 Train Miles = 5.34 Non-Fatal Casualties at Grade Crossings/MM Train Miles
- 2,741 Total Fatal Casualties/2,265,435,230 Train Miles = 1.21 Fatal Casualties at Grade Crossings/MM Train Miles

It was calculated that the transport of 37.4 MMTA of coal will require 9,490,625 train miles per year (Harter Williams Associates 1981). Using the above accident and casualty rates, it can be estimated that the shipment of this amount of coal will result in 48 grade crossing accidents per year, in which there will be 51 non-fatal casualties and 12 fatal casualties among people other than railroad employees and train passengers. (Railroad employees and passengers account for an additional 2 non-fatal casualties and 0.1 additional fatalities.)

These predictions must be considered as an upper bound. In 1977 and 1978, the accident rate for Burlington Northern coal trains was one-third the accident rate for other Burlington Northern trains (U.S. DOT 1978, p. 80; U.S. DOT 1979b, p. 93; Boyce 1980b). It is more than likely that the accidents expected would reflect the record of the safer coal train; indeed, it might well be expected that non-fatal casualties due to the movement of 37.4 MMTA would number approximately 17 and deaths approximately 4.

To provide some measure of accuracy of this estimate, it was compared with the estimates developed in the OTA study. Using a methodology developed by Coleman and Stewart, it was estimated that 36.5 MMTA of coal would result in 3.4 additional deaths and 14 additional injuries above the baseline case. In analyzing a rail route from Wyoming to Houston with 1393 grade crossings, the OTA found that a 90 percent increase in train volume would result in a 21 percent increase in deaths and injuries (Rogozen, Margler, Martz, and Hausknecht 1977).

In addition to these published reports documenting the problem of rail-related highway accidents, phone calls were made to several states and cities to inquire specifically about existing or anticipated problems with at-grade crossings. The states contacted were Nebraska, Kansas, Missouri, Oklahoma, Arkansas, and Louisiana. The issues identified are discussed below.

Nebraska. The State Department of Transportation provided the following information on at-grade crossings in Alliance and Lincoln.

Alliance. Only two BN at-grade crossings exist in Alliance. Information concerning these is given in Table III-8. Plans are to build a viaduct in the next two to three years for one of these crossings. According to the Railroad Liaison Engineer, neither of these crossings is particularly hazardous. No signal projects have been scheduled in the near future (Tompkins 1980).

Lincoln. The city of Lincoln and Lancaster County have seen a steady and substantial growth since their beginnings in the years between 1859 and 1867. From a pre-World War II total of 81,984, the city's population rose to 98,884 in 1950; 128,521 in 1960, and 149,518 in 1970 (U.S. DOT 1977b). The Bureau of the Census estimated that this steady growth was continued in the 1970s. Its July 1, 1975, population estimate for Lincoln was 163,112 and for Lancaster County, 181,659.

Six railroads are operating in Lincoln: Burlington Northern (BN), Union Pacific (UP), Chicago & North Western (C&NW), Missouri Pacific (MP), Chicago, Rock Island & Pacific (CRI&P), and Omaha, Lincoln & Beatrice (OL&B). Five of these railroads reached the city between 1870 and 1892.

The BN, which has the longest service record, connects with Denver, Chicago, Omaha, and Kansas City. Its facilities include a two-track corridor

TABLE III-8

BN GRADE CROSSINGS IN ALLIANCE, NEBRASKA

Location	Maximum Protection Type	Average Daily Highway Traffic	Number of Trains Daily[a]
Kansas Street	Flashing Lights & Gates	400	13
10th Street	Flashing Lights & Gates	2600	31

Source: Nebraska Department of Transportation 1980.

[a] Refers to BN traffic only.

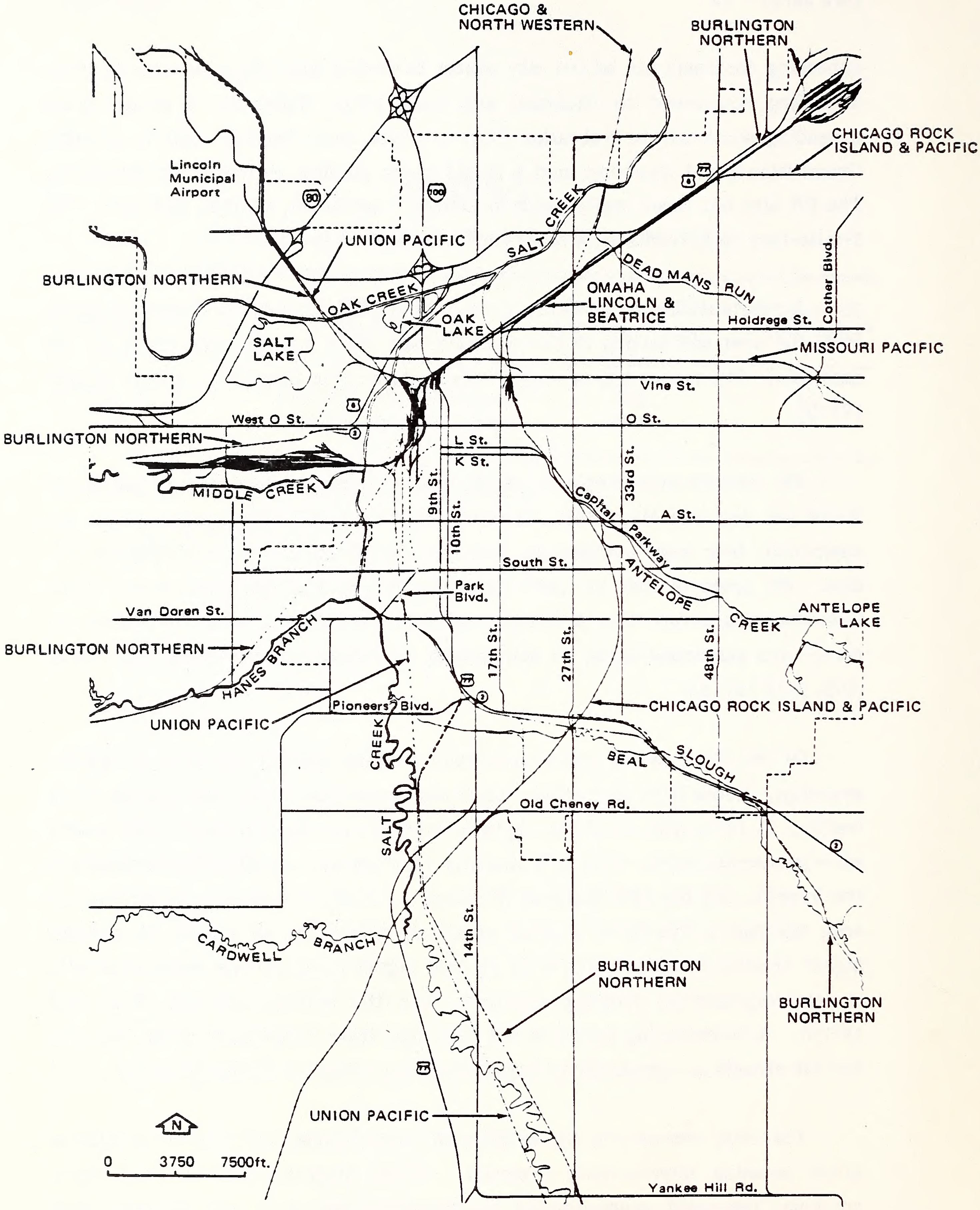
extending northeast out of the city center to Omaha and Chicago; a single track extending southward to Hickman and Falls City, Nebraska; a single track extending southeast to Nebraska City; a single track leading west to Seward, Grand Island, and Wyoming, and a single track leading northwest to Columbus. The BN also has three major yards in Lincoln - northeast, central, and west. The 3-mile-long by 1/4-mile-wide west yard is by far the largest.

A substantial and increasing portion of the BN movements entering Lincoln from the west and exiting to the northeast and south are unit coal trains of 100 cars each. The return trip of empty cars is also routed through Lincoln (U.S DOT 1977b).

BN through-movements crossing West O Street in 1974 amounted to 33 trains per day (see Map III-1). Twenty-eight of these trains were north- and eastbound, four were southbound, and one was directed to the Nebraska City line. BN projects that by 1980 its daily freight and unit-coal train traffic (including the return trip of empty unit-coal trains) will total 70 trains: 46 north- and eastbound units, 22 southbound units and two Nebraska City trains (U.S. DOT 1977b).

Of the 404 existing highway/railroad crossing points in Lincoln, 21 are BN crossings. Table III-9 gives their locations, protection types, and average daily traffic. In 1970, only 48 of the highway/railroad crossings in the city and county were grade-separated. This is a statistic that has not significantly improved in the interim. As the 1970 Railroad Transportation Study pointed out, the Lincoln area has had a five-times greater acccident incidence, an almost 50 percent higher fatality incidence, and a 45 percent higher severity rate associated with its highway/railroad crossing accidents than the national average (U.S DOT 1977b). A contributing factor is the fact that train movements along 3rd, 4th, and 5th streets are presently an impediment to emergency vehicle access.

The city, recognizing the severity of this problem, has pursued a vigorous grade crossing improvement program. These improvements include signal controls, improved gradecrossing maintenance, and gate and flashing light installation. In addition, the city has examined the issue of certain railroad



Source: U.S. DOT 1977b. Corridors C and D Draft Environmental Impact Statement, a Rail Relocation and Consolidation Demonstration Project, Lincoln, Nebraska.

Map III-1. LINCOLN, NEBRASKA, RAIL ROUTES

TABLE III-9

BN GRADE CROSSINGS IN LINCOLN, NEBRASKA

Location	Maximum Protection Type	Average Daily Highway Traffic
70th & Custer	Flashing Lights & Gates	3,500
44th & Freemont	Flashing Lights & Gates	2,600
36th & Adams	Flashing Lights & Gates	13,100
33rd & Cleveland	Flashing Lights & Gates	7,665
27th & Walker	Flashing Lights & Gates	10,200
17th & Holdrege	Flashing Lights & Gates	5,790
14th & Charleston	Flashing Lights	5,200
2nd & J	Cross Bucks	560
1st & J	Flashing Lights & Gates	1,000
2nd & H	Cross Bucks	100
3rd & F	Flashing Lights	1,270
3rd & E	Cross Bucks	300
3rd & D	Cross Bucks	540
3rd & C	Cross Bucks	190
3rd & B	Cross Bucks	200
3rd & A	Flashing Lights	4,780
3rd & South	Cross Bucks	3,465
3rd & Park	Flashing Lights	4,150
3rd & Hill	Cross Bucks	110
3rd & Van Dorn	Flashing Lights	2,825
9th & Calvert	Cross Bucks	10

Source: Nebraska Department of Transportation 1980.

relocations and consolidations to relieve safety hazards and traffic congestion problems.

Kansas.

Kansas City. The State Department of Transportation has indicated that the following five railroad companies have grade crossings in Kansas City:

- Kansas City Southern
- MoPac
- St. Louis & San Francisco (SLSF)
- Rock Island (CRI&P)
- Atchison, Topeka & Santa Fe

Tables III-10 and III-11 describe grade crossings in both the Kansas and Missouri portions of Kansas City that would be affected by increased coal train traffic. A considerable number of grade crossings are located immediately south of Kansas City. According to Mr. Ralph Carroll of the Engineering and Design Division, a program of installation of warning devices is underway in the vicinity. Only one of the crossings, located at 159th Street in Johnson County, was noted to be hazardous. At this locality conflicts between fast trains and school buses have occurred. The Engineering and Design Division is in the process of installing signals and gates to allieviate this conflict (Carroll 1980).

In addition to requesting information on grade crossings for Kansas City, the Department of Transportation was asked to provide grade crossing information for four smaller Kansas cities that have been identified as being potentially affected by an increase in trains. These cities are Coffeyville, Emporia, Osawatomie, and Parsons. Grade crossing information for these cities (i.e., crossing location, protection type, average daily traffic, and hazard rating) are given in Tables III-12 through III-16

Coffeyville. According to Mr. Hicks of the Safety Division of the Kansas Department of Transportation, the MP operates 11 to 13 trains daily from Kansas City to Coffeyville. Four of these trains are unit trains (Hicks 1980). It

TABLE III-10

POTENTIAL GRADE CROSSING PROBLEMS IN KANSAS CITY, MISSOURI

	Maximum Protection Type					
Average Daily Highway Traffic	Nothing/ Unknown	Cross Bucks	Stop Signs	Flashing Lights	Gates	Totals
0 - 250	7	31	1	-	1	40
251 - 500	7	9	-	9	2	27
501 - 1,000	3	10	-	4	-	17
1,001 - 2,000	1	13	1	4	1	20
2,001 - 3,000	-	8	-	2	-	10
3,001 - 4,000	-	4	-	-	-	4
4,001 - 5,000	2	2	-	-	-	4
5,001 - 6,000	-	-	-	1	-	1
6,001 - 7,000	1	-	-	1	-	2
7,001 - 8,000	-	1	-	-	-	1
8,001 - 9,000	1	-	-	-	-	1
Totals	22	78	2	21	4	127

Source: Peat, Marwick, Mitchell & Co. 1979a.

TABLE III-11

POTENTIAL GRADE CROSSING PROBLEMS IN KANSAS CITY, KANSAS

Location	Maximum Protection Type	Average Daily Highway Traffic
28th	Cross Bucks	600
Lamar Ave.	Gates	4,545
Roe Lane	Gates	4,515
Mills Street	Flashing Lights	1,310
K-10, SW Blvd.	Flashing Lights	9,200
Kansas Avenue	Gates	1,075
Kansas Avenue	Cross Bucks	1,075
65th Street	Cross Bucks	300
61st Street	Gates	1,000

Source: Peat, Marwick, Mitchell & Co. 1979a.

TABLE III-12

GRADE CROSSINGS IN SELECTED CITIES IN KANSAS

City	Population	No. of Grade Crossings		Avg. Daily Traffic		No. Identified as Problem[a]	
		Protected	Unprotected	Min	Max	FHA	KDOT
Kansas City[b]	174,101	105	22	0	9,000		
Emporia	23,447	18	1				
Coffeyville	15,537	34	6	387	10,490	10	10
Osawatomie	4,156	4	0	129	1,441	1	1
Parsons	12,356	31	0	469	11,630	2	6

Sources: Kansas Department of Transportation 1980.

[a] Represents grade crossings having highest priority (i.e., top 5%) for improvements. Ratings of the two agencies do not necessarily correspond.

[b] Information for Kansas City is taken from the C&NW report prepared by Peat, Marwick, Mitchell (1979a) and is therefore incomplete. Information comparable to that for other cities is forthcoming.

TABLE III-13

GRADE CROSSINGS IN COFFEYVILLE, KANSAS

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad	Railroad Crossing Hazard Ratings	
				Federal Highway Administration	Kansas Department of Transportation
Read	No Protection	762	MP	1,652	3,861
14th Street	Gates	1,320	MP	1,310	503
14th Street	Flashing Lights & Bell	1,320	MP	193	114
Spruce	Flashing Lights & Bell	2,120	MP	838	374
Willow	Flashing Lights & Bell	2,095	MP	1,324	312
Elm	Flashing Lights & Bell	762	MP	2,339	670
Maple	Cross Bucks	762	MP	57	992
Maple	Flashing Lights & Bell	762	MP	2,852	837
Maple	Cross Bucks	762	MP	467	3,874
US 169 Walnut	Gates	8,735	AT&SF	1,294	356
US 169 Walnut	Gates	8,735	MP,MKT,AT&SF	73	12
Elmwood	Cross Bucks	762	MKT	5,959	1,891
Elmwood	No Protection	762	MKT	1,007	3,061
Eldridge	No Protection	255	MKT	577	5,146
Eldridge	Cross Bucks	387	MKT	1,860	2,438
Eldridge	Cross Bucks	387	AT&SF	2,340	2,564
15th Street	Cross Bucks	762	AT&SF	2,681	1,990
15th Street	Cross Bucks	762	MKT	2,178	1,755
14th Street	Cross Bucks	870	MKT	1,026	1,643
14th Street	Cross Bucks	870	AT&SF	321	861
Independence	Flashing Lights & Bell	1,775	MP	1,929	276

TABLE III-13 Concluded

GRADE CROSSINGS IN COFFEYVILLE, KANSAS

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad	Railroad Crossing Hazard Ratings	
				Federal Highway Administration	Kansas Department of Transportation
9th Street	Flashing Lights & Bell	762	MKT	3,077	1,294
9th Street	Flashing Lights & Bell	762	AT&SF	1,959	756
8th Street	Flashing Lights & Bell	3,212	MKT	1,512	835
8th Street	Flashing Lights & Bell	3,212	AT&SF	376	289
7th Street	Flashing Lights & Bell	762	MKT	3,393	1,717
7th Street	Flashing Lights & Bell	762	AT&SF	1,334	683
4th Street	Flashing Lights & Bell	3,297	MKT	1,184	375
4th Street	Flashing Lights & Bell	3,297	AT&SF	798	246
1st Street	Flashing Lights & Bell	1,355	MKT	1,177	734
1st Street	Flashing Lights & Bell	1,355	AT&SF	781	522
Martin	No Protection	762	MKT	131	1,833
Martin	No Protection	762	MKT	394	3,162
Martin	Cross Bucks	762	AT&SF	3,431	2,083
Martin	Cross Bucks	762	MKT	3,432	2,049
Buckeye	No Protection	1,955	MP	162	2,267
4th Street	Cross Bucks	2,732	AT&SF,MP	726	2,205
5th Street	Cross Bucks	400	MP	1,335	2,952
8th Street	Cross Bucks	6,695	MP	117	360
US 166	Cross Bucks	10,490	MP	144	369

Source: Kansas Department of Transportation 1980.

TABLE III-14

GRADE CROSSINGS IN EMPORIA, KANSAS

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad	Railroad Crossing Hazard Ratings	
				Federal Highway Administration	Kansas Department of Transportation
6th	Cross Bucks	349	AT&SF	3,357	4,945
Graphic Arts	Cross Bucks	250	AT&SF	3,763	5,172
US 50	Cross Bucks	4,425	AT&SF	181	1,392
W 12th	Cross Bucks	1,756	AT&SF	1,876	2,969
Hatcher	Cross Bucks	558	AT&SF	3,997	4,658
15th	No Protection	558	AT&SF	424	4,410
Constitution	Cross Bucks	558	AT&SF	104	167
Constitution	Cross Bucks	558	AT&SF	195	605
Merchant	Gates	558	AT&SF	388	259
Commercial	Gates	4,088	AT&SF	86	7
Market	Flashing Lights & Cantilevered	558	AT&SF	1,411	211
Union	Flashing Lights & Cantilevered	558	AT&SF	1,211	195
Exchange	Flashing Lights & Cantilevered	745	AT&SF	704	163
Cottonwood	Flashing Lights	558	AT&SF	944	209
Sylvan	Flashing Lights	558	AT&SF	770	230
East	Gates	1,360	AT&SF	508	101
US 50, 6th	Cross Bucks	8,815	AT&SF	225	679
US 50, 6th	Cross Bucks	8,815	AT&SF	224	688
Whilden	Gates	2,610	AT&SF	3,762	299

Source: Kansas Department of Transportation 1980.

TABLE III-15

GRADE CROSSINGS IN OSAWATOMIE, KANSAS

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad	Railroad Crossing Hazard Ratings	
				Federal Highway Administration	Kansas Department of Transportation
Pacific	Gates	390	MP	1,441	607
Brown	Cross Bucks	390	MP	129	751
Main	Gates	3,955	MP	1,079	77
Carr	Cross Bucks	390	MP	535	665

Source: Kansas Department of Transportation 1980.

TABLE III-16

GRADE CROSSINGS IN PARSONS, KANSAS

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad	Railroad Crossing Hazard Ratings	
				Federal Highway Administration	Kansas Department of Transportation
Southern	Cross Bucks	1,600	MKT	429	491
Appleton	Gates	2,275	MKT	1,332	234
Morgan	Cross Bucks	469	MKT	673	940
Grand	Cross Bucks	469	MKT	546	1,056
Crawford	Cross Bucks	6,180	MKT	969	1,519
Crawford	Gates	6,180	MKT	819	62
Tenth	Cross Bucks	580	SLSF	3,258	2,200
Thirteenth	Cross Bucks	1,135	SLSF	787	1,198
Fourteenth	Cross Bucks	469	SLSF	5,633	2,391
Fifteenth	Cross Bucks	469	SLSF	4,779	2,096
US 59, 16th	Cross Bucks	6,380	SLSF	332	422
Seventeenth	Cross Bucks	469	SLSF	3,019	2,312
Central	Cross Bucks	469	SLSF	2,772	1,970
Twentieth	Cross Bucks	469	SLSF	7,925	2,501
Twenty-First	Cross Bucks	1,710	SLSF	1,308	826
Twenty-Second	Cross Bucks	469	SLSF	3,994	1,817
Twenty-Fourth	Cross Bucks	469	SLSF	3,905	2,046
Twenty-Fifth	Cross Bucks	469	SLSF	2,216	2,077
Appleton	Cross Bucks	2,730	SLSF	602	776
Twenty-Sixth	Cross Bucks	530	SLSF	5,096	2,042
Twenty-Seventh	Cross Bucks	469	SLSF	3,652	2,015

TABLE III-16 Concluded

GRADE CROSSINGS IN PARSONS, KANSAS

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad	Railroad Crossing Hazard Ratings	
				Federal Highway Administration	Kansas Department of Transportation
Morgan	Cross Bucks	469	SLSF	2,336	2,327
Thirty-First	Cross Bucks	469	SLSF	1,068	2,164
US 160, Main	Flashing Lights & Bell	11,630	SLSF	1,088	288
Thirty-Second	Cross Bucks	3,645	SLSF	580	691
Crawford	Gates	6,180	MKT	703	34
Grand	Cross Bucks	469	MKT	857	1,159
Morgan	Cross Bucks	469	MKT	1,114	1,118
Appleton	Gates	2,275	MKT	1,919	413
Southern	Cross Bucks	2,755	MKT	1,067	690
Twenty-First	Cross Bucks	469	MKT	9,322	9,331

Source: Kansas Department of Transportation 1980.

has been estimated that while BN daily train traffic to Coffeyville could increase by 45 percent by 1985, unit coal trains could double. Increased frequency of railroad usage by larger and heavier trains will increase confrontations with highway vehicles at grade rail crossings in the community. The negative effect may be especially severe in cases where major arterial streets and highways cross these rail lines at grade and/or where protection in minimal or nonexistent. An example of this type of problem crossing in Coffeyville is where Buckeye Street is in conflict with the Missouri Pacific Railroad line. Although the average daily traffic here is estimated at 1,955, there is currently no protection at the crossing. Other areas in the city lacking any protection at grade crossings include Elmwood, Eldridge, and Martin streets, which are at grade with the MKT railroad.

Emporia. Emporia (population 23,447) is a crew change/maintenance stop for the AT&SF. The city has a problem crossing located at Commercial Street (a major arterial street) and the AT&SF line. Fifty trains daily, including two coal trains and four switching trains, traverse this area. Traffic blockage often results.

Osawatomie. Osawatomie (population 4,156) is a crew change/maintenance stop for the MP railroad. Increased rail traffic could have a negative effect, particularly at the crossing located at Main Street. This area is traversed by twelve MP trains daily, including four coal and seven switching trains. The average daily traffic (ADT) is estimated to be 3,955 vehicles, a significant number for a community of this size. Protection at present, however, consists of gates only.

Parsons. Parsons (population 12,356) is a crew change/maintenance stop for the MKT railroad. Several crossings in this city rank highest in priority among the crossings slated for improvement by the state. For example, Crawford Street, which is traversed by the MKT railroad line, has an ADT of 6,180 and is ranked 34th (out of the state's 9,339 crossings) by the Kansas Department of Transportation in terms of safety improvement needs. Other crossings located in Parsons with high hazard ratings include Appleton Street and US 160/Main, ranking 234th and 288th respectively.

Missouri. According to Federal Railroad Administration (1980) data, there are 147 grade crossings in Joplin, 61 in Independence, and 60 in Carthage (Tables III-17, III-18, and III-19, respectively). Four different railroads use these crossings, which vary in average daily use from 25 to 8650.

Arkansas. The Arkansas Transportation Commission and the State Rail Plan office provided information on grade rail crossings. In North Little Rock there are 106 at-grade crossings, of which 47 are MP crossings. In Little Rock there are 100 at-grade crossings of which 53 are MP crossings.

Oklahoma. We contacted the Oklahoma Department of Transportation and requested grade rail crossing information for the city of Watts, crew change site for the KCS. According to Mr. R.D. Barnett (1980), "There are a total of nine trains daily through Watts; 1.6 of these are coal trains." The city has four at-grade crossings, each having an ADT of 100. There has been no articulated concern about rail traffic in Watts. When questioned about statewide grade rail crossing problems, Mr. Barnett informed us that in Wagner citizens are sufficiently concerned that they would be willing to pay half the cost of an overpass. Both the MoPac and AT&SF pass through Wagner. The AT&SF parallels US 69 which crosses the town, whereas the route of the MoPac runs through the town from the northwest to the southeast. When trains stop for crew change and fueling, the town is blocked in parts for long periods (Barnett 1980).

Louisiana. We contacted the Louisiana Department of Transportation and Development and requested information concerning grade crossings and accident statistics for rail grade crossings in Shreveport, Monroe, and Alexandria. This information is forthcoming. We were told that at present the KCS has three to five coal trains weekly. These trains pass through the northwest edge of Shreveport, about 6-7 miles from the downtown area, and then head west to the rail yards in Blanchard. If there were an increase in coal traffic enroute to Baton Rouge, however, trains would probably be routed through the center of the city (Smith 1980).

Other types of accidents with potential for personal injury and property damage are derailment and mechanical or electrical failures. From 1977 through

TABLE III-17

GRADE CROSSINGS IN JOPLIN, MISSOURI

Location	Maximum Protection Type	Average Daily Traffic	Railroad
McFerran Street	Cross Bucks	25	KCS
Texas Street	Cross Bucks	100	KCS
Route Z	Flashing Lights	4006	KCS
North 23rd Street	Highway Signal with Bells	200	KCS
4th Street	Flashing Lights	166	KCS
5th Street	Cross Bucks	5600	KCS
9th Street	Cross Bucks	2500	KCS
12th Street	Cross Bucks	500	KCS
15th Street	Flashing Lights	7457	KCS
18th Street	Cross Bucks	1525	KCS
20th Street	Flashing Lights	8800	KCS
New Hampshire Street	Cross Bucks	200	KCS
Connecticut Street	Cross Bucks	2100	KCS
County Line Road Rte. FF	Flashing Lights	1942	KCS
Davis Boulevard	Cross Bucks	50	KCS
Mina	Cross Bucks	60	MKT
North Schifferdecker Rte. P	Cross Bucks	2400	MKT
Murphy	Cross Bucks	75	MKT
	Cross Bucks	55	MKT
	Cross Bucks	85	MKT
	Cross Bucks	90	MKT
Newman Road	Flashing Lights	2525	MP
US-71	Flashing Lights	5556	MP
Hodgdon Road	Cross Bucks	1700	MP
City Street	Cross Bucks	500	MP
City Street	Cross Bucks	500	MP
City Street	Cross Bucks	400	MP
Florida	Flashing Lights	3425	MP
Connecticut Avenue	Cross Bucks	780	MP

TABLE III-17 Continued

Location	Maximum Protection Type	Average Daily Traffic	Railroad
St. Louis Avenue	Flashing Lights	550	MP
Murphy Boulevard	Cross Bucks	550	MP
Illinois	Cross Bucks	6975	MP
Missouri Avenue	Cross Buck	2450	MP
Pennsylvania Avenue	Gates	325	MP
Main Street	Flashing Lights	5600	MP
Joplin Avenue	Flashing Lights	8650	MP
Wall Street	Flashing Lights	4300	MP
Pearl Street	Flashing Lights	925	MP
Byers Street	Cross Bucks	470	MP
Moffet Avenue	Cross Bucks	350	MP
Sergeant Street	Cross Bucks	300	MP
Jackson Avenue	Cross Bucks	1100	MP
Virginia Avenue	Special Protection	3200	MP
Alley	Special Protection	150	MP
Pennsylvania Avenue	Special Protection	850	MP
Kentucky Avenue	Special Protection	850	MP
Alley	Special Protection	50	MP
Grand Avenue	Special Protection	510	MP
Pennsylvania	None	600	SLSF
Byers	Cross Bucks	360	SLSF
Moffet	Cross Bucks	390	SLSF
Sergeant	Cross Bucks	260	SLSF
Jackson	Cross Bucks	1050	SLSF
Connor	Cross Bucks	570	SLSF
Murphy	Cross Bucks	790	SLSF
Picher	Cross Bucks	700	SLSF
Empire	Cross Bucks	400	SLSF
Porter	Cross Bucks	350	SLSF

TABLE III-17 Continued

Location	Maximum Protection Type	Average Daily Traffic	Railroad
Maiden Lane	Cross Bucks	3900	SLSF
Maiden Lane	Cross Bucks	3900	SLSF
Cunningham	None	50	SLSF
7th U.S. 66	Cross Bucks	9500	SLSF
7th U.S. 66	Cross Bucks	9500	SLSF
Willard	None	50	SLSF
Alley	None	20	SLSF
Roosevelt	Cross Bucks	630	SLSF
Alley	None	20	SLSF
McKinley	Cross Bucks	410	SLSF
Jefferson	Cross Bucks	350	SLSF
Schifferdecker	None	3200	SLSF
Zora	Flashing Lights	1800	SLSF
St. Louis	Cross Bucks	750	SLSF
St. Louis	Cross Bucks	750	SLSF
High	Cross Bucks	300	SLSF
North	None	70	SLSF
Furnace	Cross Bucks	100	SLSF
Valley	Cross Bucks	150	SLSF
Hill	Cross Bucks	200	SLSF
Broadway	Flashing Lights	6000	SLSF
Central	Cross Bucks	5970	SLSF
East 2nd	Cross Bucks	100	SLSF
3rd	Highway Signal with Bells	180	SLSF
School	Cross Bucks	450	SLSF
4th	Flashing Lights	5100	SLSF
5th	Cross Bucks	2000	SLSF
Murphy Boulevard	Cross Bucks	800	SLSF
Kentucky	Cross Bucks	650	SLSF
Joplin	Cross Bucks	8000	SLSF

TABLE III-17 Continued

Location	Maximum Protection Type	Average Daily Traffic	Railroad
12th	Cross Bucks	1000	SLSF
Iowa	Cross Bucks	250	SLSF
14th	Cross Bucks	50	SLSF
Missouri	Cross Bucks	350	SLSF
Grand	Cross Buck	400	SLSF
Kentucky	Cross Bucks	250	SLSF
Pennsylvania	Cross Bucks	650	SLFS
Virginia	Flashing Lights	2900	SLSF
14th	Flashing Lights	2000	SLSF
Main	Flashing Lights	5550	SLSF
Joplin	Flashing Lights	7400	SLSF
Wall	Flashing Lights	100	SLSF
Byers	Cross Bucks	150	SLSF
Moffett	Flashing Lights	400	SLSF
Sergeant	Flashing Lights	260	SLSF
Jackson	Cross Bucks	1050	SLSF
Jungle Boulevard 13th	Cross Bucks	210	SLSF
Murphy	Cross Bucks	790	SLSF
Maiden Lane	Cross Bucks	5800	SLSF
Roosevelt	Cross Bucks	2020	SLSF
20th	Cross Bucks	4100	SLSF
Schifferdecker	Flashing Lights	1950	SLSF
Missouri	Cross Bucks	660	SLSF
Pennsylvania	Gates	600	SLSF
West 13th	Flashing Lights	250	SLSF
Wall	Flashing Lights	1000	SLSF
West 10th	Flashing Lights	500	SLSF
Moffett	Flashing Lights	500	SLSF
Public Alley	None	75	SLSF
West 9th	Cross Bucks	250	SLSF

TABLE III-17 Concluded

Location	Maximum Protection Type	Average Daily Traffic	Railroad
Sergeant	Cross Bucks	275	SLSF
Public Alley	None	75	SLSF
West 8th	Cross Bucks	1600	SLSF
Jackson	Cross Bucks	200	SLSF
Public Alley	None	50	SLSF
West 7th and 66 Highway	Flashing Lights	5580	SLSF
Public Alley	None	50	SLSF
West 6th and Gray	Cross Bucks	1300	SLSF
5th Street	Cross Bucks	1200	SLSF
Picher	Cross Bucks	1200	SLSF
West 4th	Highway Signal with Bells	5080	SLSF
West 2nd	Cross Bucks	2000	SLSF
A Street and Harlem	Cross Bucks	250	SLSF
B Street	Cross Bucks	150	SLSF
Porter	Cross Bucks	800	SLSF
C Street	Cross Bucks	1050	SLSF
A Street	Highway Signal with Bells	280	SLSF
West B Street	Cross Bucks	150	SLSF
C Street	Cross Bucks	1025	SLSF
West Perkins	Cross Bucks	1050	SLSF
Murphy	Cross Bucks	810	SLSF
Lone Elm	Highway Signal with Bells	175	SLSF
Fountain Road	Cross Bucks	150	SLSF
Fir	Cross Bucks	150	SLSF
Iron Gates Road	Cross Bucks	50	SLSF
Black Cat 28th	Cross Bucks	75	SLSF
Central City (29th)	Cross Bucks	50	SLSF
State Line	Cross Bucks	75	SLSF
Mt. Hope	Cross Bucks	200	SLSF

Source: Federal Railroad Administration 1980.

TABLE III-18

GRADE CROSSINGS IN CARTHAGE, MISSOURI

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad
Olive	Flashing Lights	1125	MP
Chestnut Street	Flashing Lights	1450	MP
Popler Street	Flashing Lights	800	MP
Cedar Street	Flashing Lights	275	MP
Macon Street	Cross Bucks	1800	MP
Centennial Street	Flashing Lights	1170	MP
County Road	Cross Bucks	100	MP
County Road	Cross Bucks	50	MP
County Road	Cross Bucks	75	MP
Plant Road	Cross Bucks	120	MP
County Road	Cross Bucks	30	MP
Vine	Cross Bucks	625	MP
Depot Road	Cross Bucks	150	MP
County Road	Flashing Lights	30	MP
County Road	Cross Bucks	30	MP
County Road	Cross Bucks	25	MP
County Road	Cross Bucks	40	MP
Central Street	Special Protection	2700	MP
Willow Street	Cross Bucks	500	MP
Locust Street	Cross Bucks	550	MP
Alley (Oak)	None	30	MP
Elm	Cross Bucks	400	MP
Main Street	Flashing Lights	1300	MP
Limestone Street	Cross Bucks	400	MP
Limestone Street	Special Protection	400	MP
West Nutmeg Road	Cross Bucks	50	MP
County Road	Cross Bucks	25	MP

TABLE III-18 Continued

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad
MO-RT-D	Flashing Lights	290	MP
County Road	Cross Bucks	30	MP
County Road	Cross Bucks	35	MP
County Road	Cross Bucks	40	MP
County Road	Cross Bucks	40	MP
County Road	Flashing Lights	40	MP
County Road	Cross Bucks	40	MP
County Road	Cross Bucks	40	MP
County Road	Corss Bucks	75	MP
County Road	Cross Bucks	50	SLSF
County Road	Cross Bucks	25	SLSF
County Road	Cross Bucks	20	SLSF
CO F	Flashing Lights	1260	SLSF
County Road	Cross Bucks	50	SLSF
County Road	Cross Bucks	100	SLSF
Chestnut	Highway Signal with Bells	1450	SLSF
River	Cross Bucks	3800	SLSF
3rd	Cross Bucks	670	SLSF
Central	Highway Signal with Bells	2700	SLSF
	Cross Bucks	400	SLSF
	Cross Bucks	80	SLSF
	Cross Bucks	70	SLSF
	Cross Bucks	1270	SLSF
	Flashing Lights	150	SLSF
Francis	Cross Bucks	150	SLSF
Mound	Cross Bucks	150	SLSF
Old 66 Highway	Highway Signal with Bells	2100	SLSF
Old 66 Highway	Cross Bucks	80	SLSF

TABLE III-18 Concluded

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad
County Road	Cross Bucks	50	SLSF
County Road	Cross Bucks	100	SLSF
County Road	Cross Bucks	50	SLSF
County Road	Cross Bucks	50	SLSF
MOD Highway	Flashing Lights	1050	SLSF

Source: Federal Railroad Administration 1980.

TABLE III-19

GRADE CROSSINGS IN INDEPENDENCE, MISSOURI

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad
39th	Highway Signal with Bells	1130	ICG[a]
Selsa Road	Highway Signal with Bells	60	ICG
Cracker Neck Road	Cross Bucks	250	ICG
McCoy or Santa Fe	Highway Signal with Bells	500	ICG
Scott	Flashing Lights	350	ICG
Harvard	Cross Bucks	1000	ICG
Northern Boulevard	Flashing Lights	250	ICG
Independence Avenue	Highway Signal with Bells	000	ICG
Arlington	Cross Bucks	2400	KCS
Hawthorne Avenue	Cross Bucks	1850	KCS
Huttig Avenue	Cross Bucks	1138	KCS
Ash Avenue	Cross Bucks	1800	KCS
Independence Avenue US-24	Cross Bucks	704	KCS
Lake Drive	Cross Bucks	1200	KCS
Northern Boulevard	Cross Bucks	800	KCS
Harris Avenue	Cross Bucks	500	KCS
Crisp Avenue	Cross Bucks	550	KCS
Claremont Avenue	Cross Bucks	600	KCS
Vermont Avenue	Cross Bucks	300	KCS
Scott Avenue	Cross Bucks	350	KCS
Grand	Cross Bucks	200	MP
Cottage Street	Cross Bucks	775	MP
Pleasant + Pacific	Cross Bucks	1100	MP
Spring Street	Cross Bucks	550	MP
Osage Street	Cross Bucks	300	MP
Liberty	None	750	MP
Short Avenue	Cross Bucks	250	MP

TABLE III-19 Continued

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad
Walnut	Flashing Lights	500	MP
Noland Road	Flashing Lights	5000	MP
Kansas Avenue	Cross Bucks	550	MP
Dodgion Avenue	Cross Bucks	400	MP
Lexington Avenue	Cross Bucks	1050	MP
Walnut Street	Cross Bucks	2500	MP
Crane Street	Cross Bucks	2500	MP
Hunter Avenue	Cross Bucks	1500	MP
Kiger Road	Cross Bucks	3560	MP
Peck Road	None	250	MP
Truman Road	Flashing Lights	3900	MP
Arlington	Gates	800	MP
Hawthorne	Cross Bucks	1200	MP
Wilson Road	Gates	2200	MP
Harvard Avenue	Flashing Lights	250	MP
Sterling Avenue	Flashing Lights	1100	MP
Claremont Avenue	Cross Bucks	600	MP
Vermont Avenue	Cross Bucks	600	MP
Scott Avenue	Flashing Lights	650	MP
Cottage Street	Gates	775	MP
Linden Avenue	Cross Bucks	250	MP
South Avenue	Flashing Lights	1100	MP
Osage	Gates	400	MP
31st Street	Gates	750	MP
35th Street	Flashing Lights	6500	MP
Little Blue Road	Flashing Lights	1030	MP
County Road	Cross Bucks	110	MP
Atherton Road	Cross Bucks	105	MP

TABLE III-19 Concluded

Location	Maximum Protection Type	Average Daily Highway Traffic	Railroad
County Road - 8N	Flashing Lights	75	MP
County Road	Cross Bucks	50	MP
County Road Ferguson Spr	Cross Bucks	50	MP
Bundschu Road	Cross Bucks	80	MP
Bly Road	Cross Bucks	50	MP
Northern Boulevard	Flashing Lights	350	KCS

Source: Federal Railroad Administration 1980.

[a] ICG = Illinois Central Gulf.

1979, derailments represented 10.1 percent of all railroad accidents, but were responsible for only 0.68 percent of all railroad non-fatal casualties and 1.24 percent of all railroad fatal casualties; most of these casualties were railroad employees. (In contrast, accidents at grade crossings represented 4.8 percent of all railroad accidents, and were responsible for 5.9 percent of all non-fatal casualties and 60.1 percent of all fatal casualties; most of these casualties were not railroad employees. See above discussion on grade crossings.) (U.S. DOT 1978, 1979b, 1980b) In addition to personal injury, derailments can also result in damage to personal property. DOT accident reports indicate railroad and non-railroad property damage as a single statistic; therefore, nonrailroad property damage statistics were obtained from BN. From 1976 through 1980, BN coal trains were involved in 7.5 percent of all BN train accidents which caused damage to nonrailroad property. Over the time period, there were an average of 2.0 coal train accidents per year causing nonrailroad property damage, with damages averaging $24,440 per year (Boyce 1980b).

Based on 24,318 derailments per 2,265,435,230 train miles traveled from 1977 through 1979 for all U.S. railroads, a figure of 10.7 derailments per million train miles is derived (U.S. DOT 1977, 1978b, 1980b). Given the accident rate of coal trains as about one-third that for all other trains (Boyce 1981), this rate drops to 3.6 derailments per million train miles, or 34 derailments per year expected from the shipment of 37.4 MMTA of coal, (9,490,625 train miles).

The 24,318 derailments from 1977 through 1979 caused 1457 non-fatal casualties and 57 fatal casualties; this is about 0.64 nonfatal casualty per million train miles, and 0.025 fatal casualty per million train miles. Thus, over the 9,490,625 train miles, the 34 derailments would lead to 6 nonfatal casualties and 0.24 fatal casualty per year.

In 1979 there were 1815 railroad accidents that resulted from mechanical and electrical failures. The total damage caused by these accidents was $76,768,530. Of this total, 62 accidents were the result of locomotive fires and resulted in $1,523,096 damage. Locomotive fires throughout the rail system therefore were responsible for 3.4 percent of mechanical and electrical failures and 2.0 percent of all related damage (U.S. DOT 1980a). Because of the way that the statistics are reported it cannot be determined to what extent these fires resulted in damage to private property. The Burlington Northern has indicated that along its routes from the South Powder River Basin to Kansas City it reported a total of 28 right-of-way fire incidents in 1979 that resulted in $10,500 damage to property, both railroad and non-railroad property (Boyce 1981). Using their overall system rate of 4.4 right-of-way fire incidents per million train miles would yield an expected 42 such incidents for the movement of 37.4 MMTA. The incidence of right-of-way fire for a unit coal train, however, is about one tenth of that for the rest of the system. Hence, the above traffic is more likely to be the cause of 14 right-of-way fires.

In addition to the threat to humans, there is also the threat that trains pose to livestock. No statistics are kept concerning train related deaths to livestock so it is difficult to estimate the problem. It is clear, however, that an increased number of trains increases the danger to free livestock. To protect them, railroads have, at great expense, fenced substantial portions of right-of-way. While this reduces the total area where accidents can occur, it is not clear just how much it reduces the problem. More frequent trains would result in decreased time per hour that cattle have to cross the tracks.

III.5 Disruption of Community Activities

Increased rail traffic carries with it concerns for the disruption of certain local community activities. Reporting on the results of the August 1979 Unit Coal Community Impact Conference sponsored by DOT, Allan Boyce of BN noted in Western Planner that five adverse impacts had been identified: emergency vehicle delay, vehicular delay in general, safety hazards, inhibitions to community growth and economic viability, and severance of community services (Boyce 1980c).

BN presented an analysis of the problem of local traffic delay in an accompanying article in the same issue of Western Planner (Boyce 1980d). In that article it was stated that BN's busiest coal route was averaging 25 trains a day at the start of 1980. With these trains moving at an average speed of 40 miles per hour, this means that a train moves through a crossing in approximately two minutes. It also means that any point on the line is occupied by a train for a total of about 50 minutes out of the 24 hours in a day.

In contrast to this estimate of a total daily delay of 50 minutes, Michael Enzi, Mayor of Gillette, presented a very different picture in Western Planner (Enzi 1980). His expanded list of community impacts included delaying and in some cases precluding water, sewer and other utility development, increased noise and dust pollution, and unique safety situations due to the carrying of hazardous freight. Enzi challenged BN's claim of only 25 trains a day, asserting that the number, even now, was closer to 60. He noted that the city's concern was with crossings that were being blocked for an unreasonable length of time as far back as four years ago. In 1967 Gillette passed an ordinance prohibiting trains from blocking crossings for more than five minutes. Finding the railroad almost immediately in violation of the ordinance, the railroad was appropriately cited. After repeated citings and subsequent fines the railroad informed the town that it was taking away its rights and privileges relating to a parking lot used by shoppers at local stores.

Investigation by the mayor revealed that the parking lot had been purchased by the city some years ago. The city and the railroad, at a meeting concerning the ordinance, considered raising the time limit to 10 minutes. Upon investigation, it was found that of the complaints filed, none had been for a blockage of less than 20 minutes and some for as long as 45 minutes. Following an exchange of ideas between the city and the railroad, several suggestions were made for correcting the delays. These included reducing the train length to 93 cars so that they would fit between intersections when parked, and limiting the amount of train switching that is done during Gillette rush hours.

The conclusions to be drawn from this review are the following:

- It is not sufficient only to examine the average speed of the train. At speed, the train presents relatively little problem, except when total number of trains is large, as is anticipated for portions of the BN route in 1991.
- The most difficulty can be anticipated where switching occurs. This is most likely in the Gillette area. It is not anticipated that the

interchange in Kansas City would present a problem as this takes place in the rail yard of one of the two railroads involved in the interchange.

- Substantial delays could occur in towns where the train stops for maintenance or crew change. The portion of the route where there are the most of these kinds of stops is along that portion of track maintained by the MP. Since the tonnage at this point is relatively low and these are relatively less traveled routes, the delays would increase, but how much cannot be said without an inventory and analysis of each of these towns.

Just as the traffic delay problem could be mitigated by the types of solutions attempted in Gillette, it could also be corrected by building overpasses. This is an expensive solution, as is rerouting, and one that the railroads would seek to avoid. As one example of equipment costs, installation of automatic signaling devices for safety reasons costs $60,000. This is paid for by the federal government but the cost of maintenance, estimated at $2500 per year, is a cost to the railroad. It is not reasonable to expect that every crossing could be protected by automatic signals; similarly, it cannot be expected that overpasses and reroutings could be built wherever they are desired. As BN has pointed out, overpasses are not always the answer either. In Moorehead, Minnesota, and Torrington, Wyoming, the central business districts are affected by the BN traffic. Building overpasses in these cases would completely disrupt the present main street layout and is not a solution that is acceptable to the town. An example of the kind of solution that can be developed jointly by the town and the railroad is found in Newcastle, Wyoming, where residents were concerned about the possibility of trains blocking emergency vehicles. To solve this problem a road was graded under a rail bridge adjacent to a small creek and about one-half block from the main crossing. If needed, this road can be used by ambulances, fire trucks or other emergency vehicles to cross to the other side of the tracks. In other towns, similar adjustments have been made. In Grand Island, Nebraska, trains are sometimes held out of town until other trains have passed through so they can proceed through Grand Island without stopping. In Gillette, BN is building a new siding, installing new crossing signals, and has changed its crew change point. All of these actions should aid in preventing blocked crossings.

The potential impact of the all-rail alternative is illustrated in Table I-1, which shows the approximate number of trains daily due to the shipment of 37.4 MMTA of coal, and the affected populations along the route. To provide a general time-delay range, Table III-20 estimates daily grade crossing delays based on unit coal train traffic, where one unit coal train is assumed to be one mile in length. Delays due to this traffic would depend on the speed of the train which is a function of track conditions, grade, equipment, and traffic control systems.

Precise estimates of the impacts due to the 37.4-MMTA-related traffic are further complicated by the fact that the railroads have been working extensively with individual towns to relieve perceived or anticipated problems. While it could be expected that related impacts would be the most severe in towns in Nebraska, it is impossible to predict the magnitude due to other projected increases in rail traffic and the changes that these may induce. Changes such as rerouting tracks around a city that is now bisected by the railroad (such as Broken Bow), would mean that there would be no impacts.

Solutions to grade crossing problems must be considered on a site-specific basis. The movement of 37.4 MMTA alone would not cause significant community disruption. Considered with other rail traffic and expectations for growth in this traffic, however, overall growth could lead to significant disruption. While this disruption cannot be identified by town or quantified for the whole of the route, it can be noted that there are increasing local attempts to correct current rail-related problems. If it is asumed that a community's willingness to spend funds for a rerouting or other rail modification effort is an adequate indication of a significant rail-related disruption, then in towns such as Lincoln the current impacts are significant and it can be expected that in the future such impacts in other towns will also be significant.

III.6 Railroad Taxes

The framework of railroad taxation across Wyoming, Nebraska, Kansas, and Missouri does not vary greatly, nor do the economic implications thereof (Clark 1981, Sandine 1981, St. Clair 1981). The taxing state follows a general procedure as follows:

TABLE III-20

GRADE CROSSING DELAY - MINUTES PER DAY

Trains per day	Train Speed 10mph	20mph	30mph	40mph	50mph
1 min	6.0 min	3.0 min	2.0 min	1.5 min	1.2 min
5	30.0	15.0	10.0	7.5	6.0
10	60.0	30.0	20.0	15.0	12.0
15	90.0	45.0	30.0	22.5	18.0
20	120.0	60.0	40.0	30.0	24.0
30	180.0	90.0	60.0	45.0	36.0

1. The value of the railroad in question is estimated (across all states)

Three methods are employed to approximate the railroad company's total worth. First, the "income method" records the net annual income, and the value of the railroad is said to be a function of this amount (Sandine 1981). Second, the "cost replacement method" estimates company value by depreciation of all railroad investments in rolling stock, property, etc. (St. Clair 1981). Finally, the "stock and debt method" accounts for all company liabilities and stockholdings from which the company value is approximated (Sandine 1981, Union Pacific 1981).

2. The state's share of the total value is determined, and tax levied

The portion of the railroad total worth to be considered taxable by each state is determined by the following:

a. Number of track miles in the state
b. Number of operating track miles in the state
c. Operating revenue in the state
d. Number of car and locomotive miles in the state
e. Number of passenger and ton miles in the state (Clark 1981, Sandine 1981, St. Clair 1981, Union Pacific 1979).

3. The tax is distributed to eligible counties

The county share of the state-levied railroad tax is normally directly proportional to the number of main line miles of track in that county (Sandine 1981, St. Clair 1981, Union Pacific 1979).

In 1980 the railroads represented 1.65 percent of total assessed evaluation in Kansas, and paid 1.64 percent of the total taxes. In counties receiving them, railroad tax revenues typically averaged 1 to 5 percent of the total county taxes (Clark 1981).

Given the future demand for Powder River Basin coals, it has been demonstrated that the Central Route will be operating at no less than 1980 capacity level for the route even with the ETSI pipeline on line by 1985. Thus, it can be said that the States through which the route passes will realize no cuts in railroad tax revenue over this time period. If traffic is guaranteed at at least the 1980 level, no major change in the factors influencing overall system value would be expected, nor would any state's individual share of that system value be expected to grow disproportionately to the others. Given no drastic routing changes, all involved counties could expect to receive the same proportionate share currently being realized (Clark 1981).

IV. COST ANALYSIS

IV.1 Previous Studies

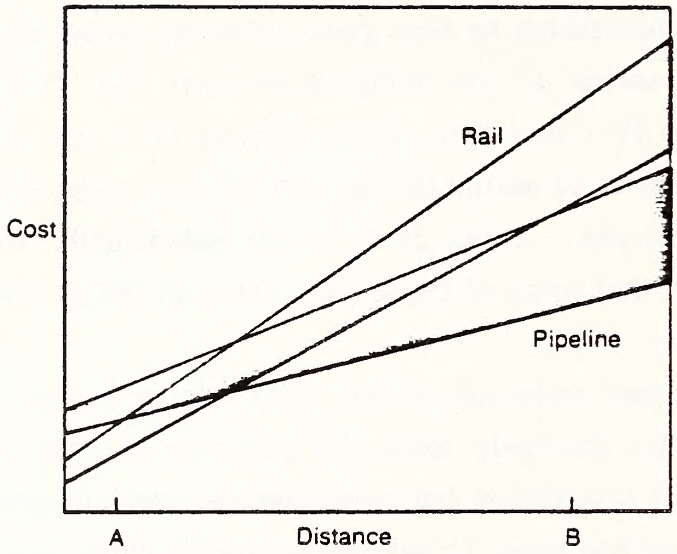
Central to the coal slurry pipeline-railroad debate is the question of comparative cost. The OTA (1978a, p. 1) summarized its results by saying that "...coal slurry pipelines do represent under some specific circumstances the least costly available means for transporting coal measured in economic terms." It further stated (OTA 1978a, p. 68) that "...the comparative costs of the two modes do not lend themselves to easy generalization based on simple criteria." Two graphical summaries of the comparisons that the OTA study made are contained in Figures IV-1 and IV-2, while Figures IV-3 and IV-4 illustrate the results of earlier efforts to estimate the cost of coal transportation by rail and by pipeline, respectively. Table IV-1 shows specifically the various cost-estimating equations that some of the studies listed in the graphs developed.

In addition to these estimates of rail costs related to coal transport, route-specific estimates are routinely made for purposes of rate making. In rate-making cases, a well established but controversial method promulgated by the ICC is used. This method seeks to set route-specific rates as a function of cost plus a rate of return on investment. The basis used is historical cost plus estimates of future operating costs. While the methodology may be criticized (Harris 1977), it is used in all rail rate cases and provides a standardized costing procedure for all goods on all routes.

As the recent ICF (1980) report pointed out, "...rail costs for a given size coal shipment are significantly influenced by their place of origin."

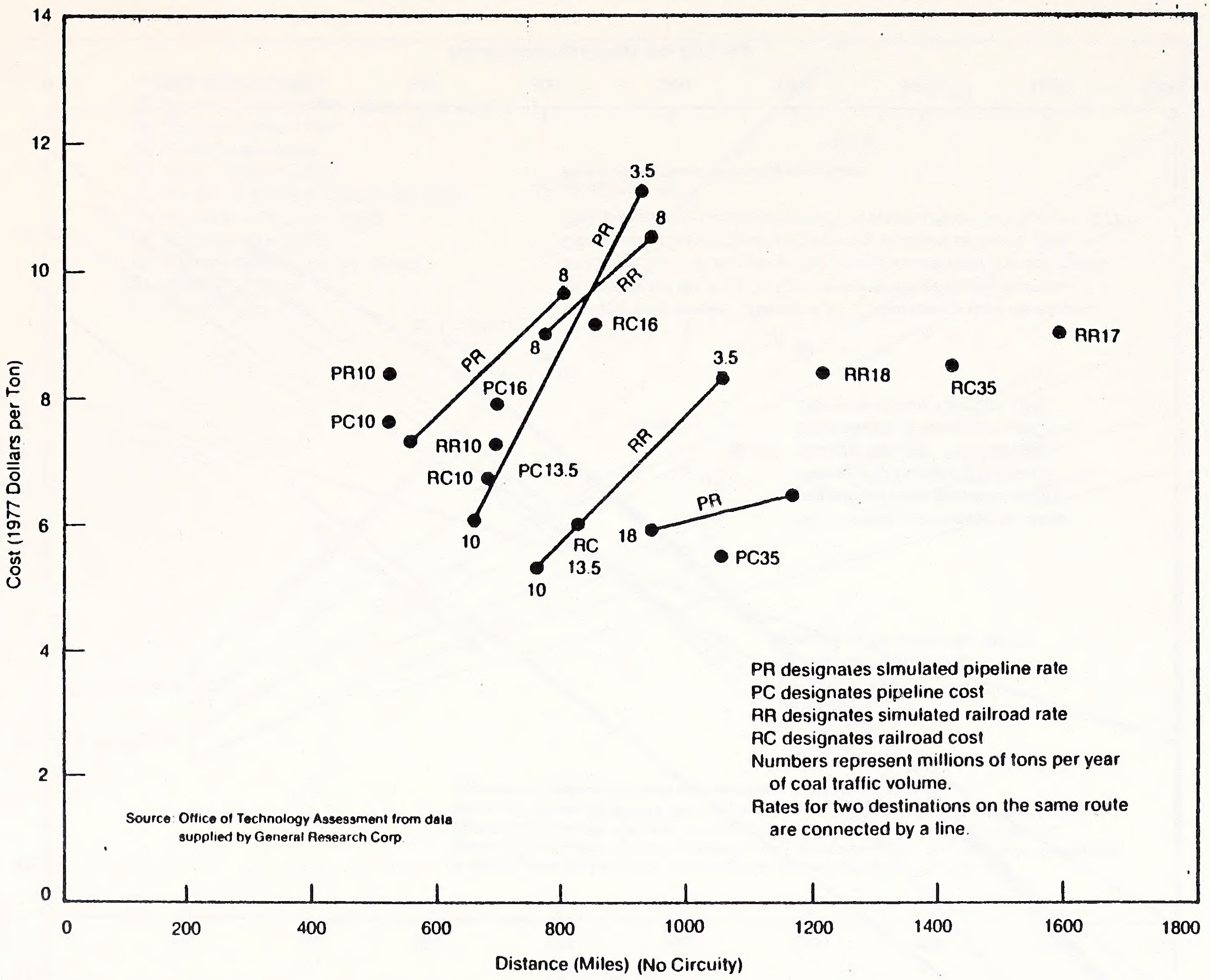
Gorden (1976) has indicated that freight costs for coal have a fixed component and a variable component that increases with the transport distance. A further influence on cost is whether the haul is single or joint. The ICF (1980) report notes:

> Rail rates are somewhat sensitive to volume (tonnage of coal moved). Many carriers do provide some economies of scale for their rates. For example, on Burlington Northern going from Belle Ayr, Wyoming, to Fort Gibson, Oklahoma (Muskogee), the current rate for moving 1,500,000 tons



Source: Office of Technology Assement, 1978a.

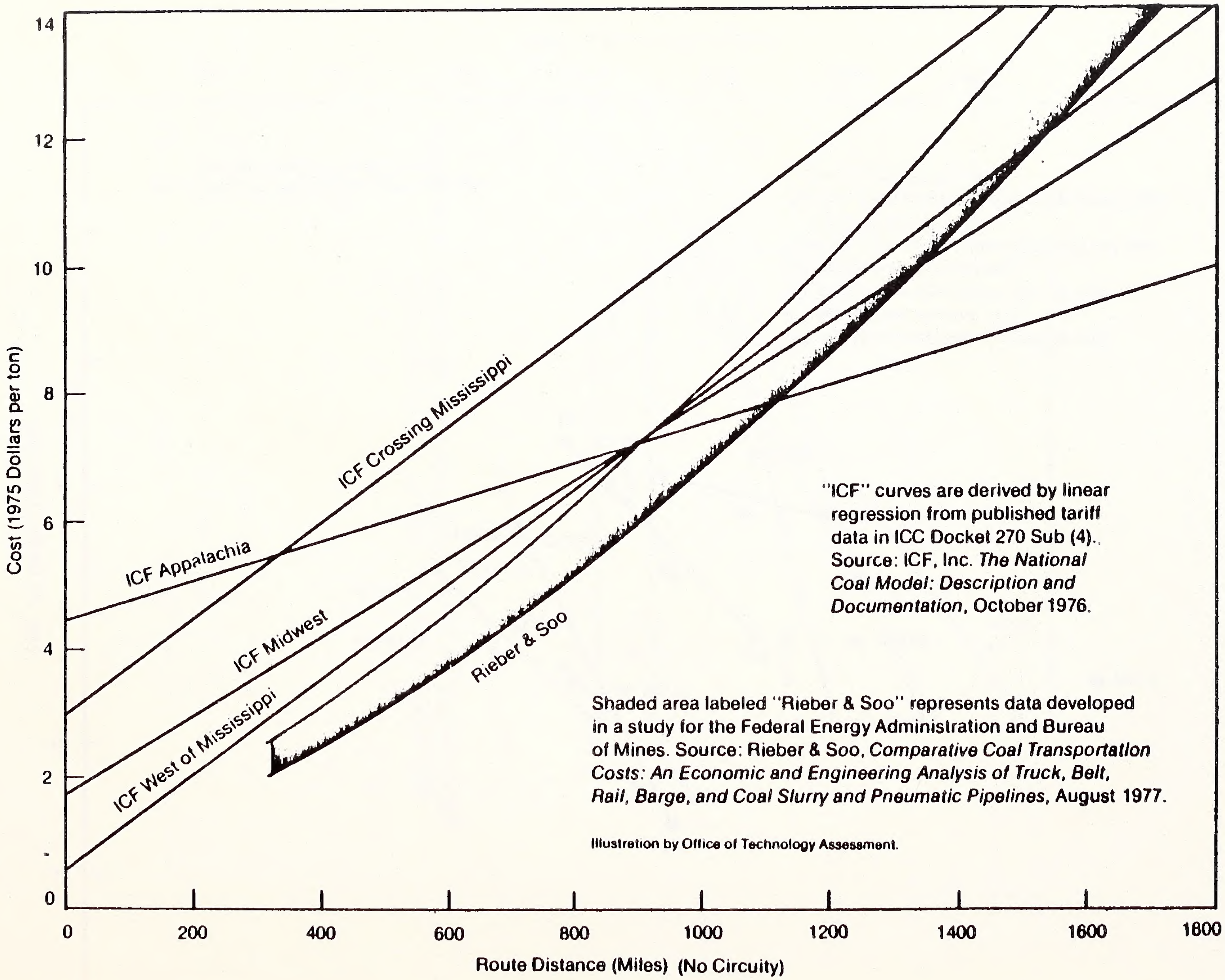
Figure IV-1. FORM OF TYPICAL RAIL AND PIPELINE COST RANGES FOR A GIVEN ANNUAL TONNAGE



PR designates simulated pipeline rate
PC designates pipeline cost
RR designates simulated railroad rate
RC designates railroad cost
Numbers represent millions of tons per year of coal traffic volume.
Rates for two destinations on the same route are connected by a line.

Source: Office of Technology Assessment from data supplied by General Research Corp.

Figure IV-2. RESULTS OF CASE STUDIES COMPARING COAL SLURRY PIPELINE AND UNIT TRAIN COSTS



"ICF" curves are derived by linear regression from published tariff data in ICC Docket 270 Sub (4). Source: ICF, Inc. *The National Coal Model: Description and Documentation*, October 1976.

Shaded area labeled "Rieber & Soo" represents data developed in a study for the Federal Energy Administration and Bureau of Mines. Source: Rieber & Soo, *Comparative Coal Transportation Costs: An Economic and Engineering Analysis of Truck, Belt, Rail, Barge, and Coal Slurry and Pneumatic Pipelines*, August 1977.

Illustration by Office of Technology Assessment.

Figure IV-3. RESULTS OF PREVIOUS COAL UNIT TRAIN COST STUDIES

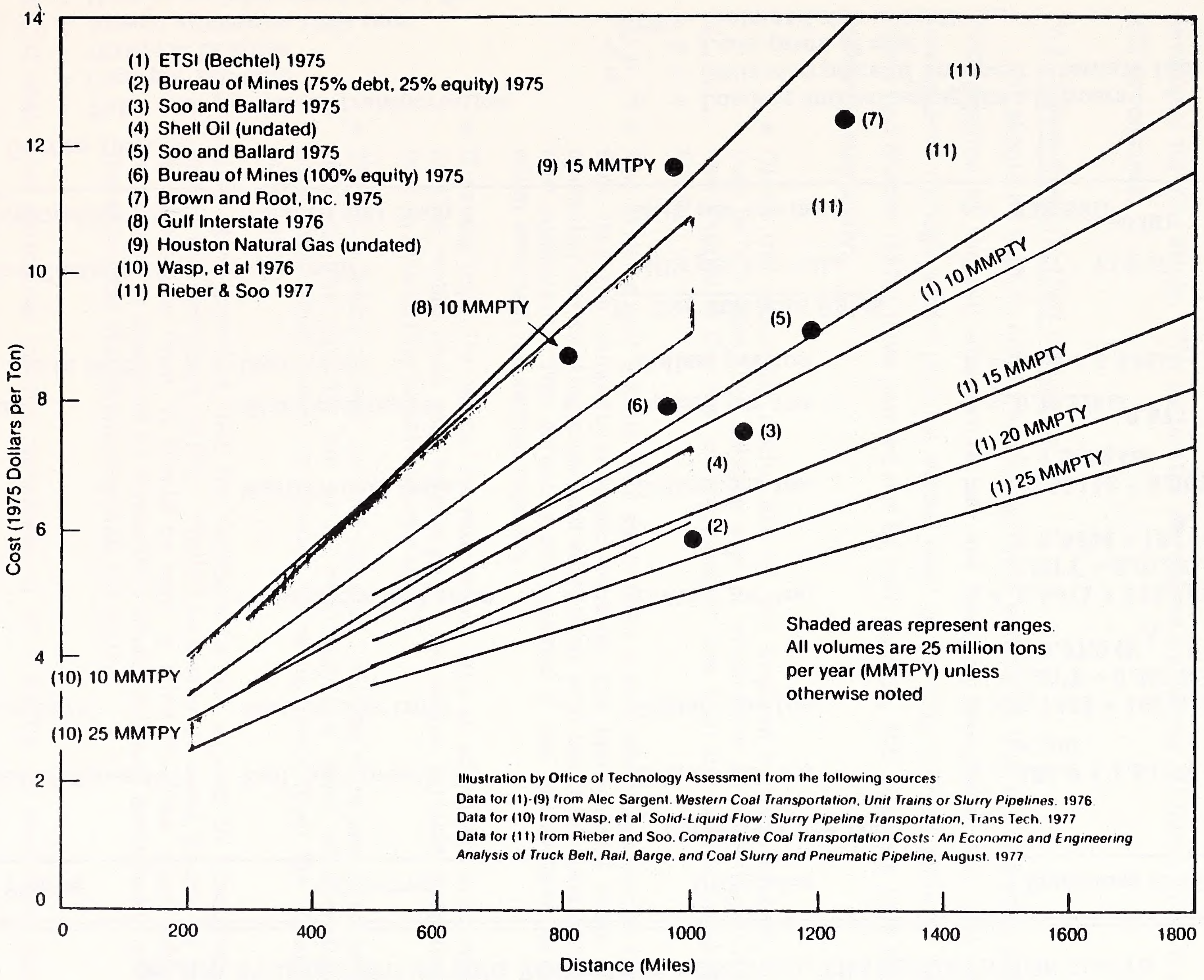


Illustration by Office of Technology Assessment from the following sources
Data for (1)-(9) from Alec Sargent. *Western Coal Transportation, Unit Trains or Slurry Pipelines.* 1976
Data for (10) from Wasp, et al *Solid-Liquid Flow: Slurry Pipeline Transportation*, Trans Tech. 1977
Data for (11) from Rieber and Soo. *Comparative Coal Transportation Costs: An Economic and Engineering Analysis of Truck Belt, Rail, Barge, and Coal Slurry and Pneumatic Pipeline*, August. 1977

Figure IV-4. RESULTS OF PREVIOUS COAL SLURRY PIPELINE COST STUDIES

TABLE IV-1

MAJOR STUDIES ESTIMATING EQUATIONS FOR COAL TRANSPORTATION COSTS

Source	Coverage	Dimension	Equations in 1975 Prices
		A. Total Cost Per Ton	
U.S. Bureau of Mines 1971	Rail, best practice	Dollars per ton	$R = 166.9 + 1.817D - 0.00131D^2 - 100$
Zimmerman 1975	Eastern unit train	Dollars per ton	$R = 0.7452 + 102.842/AV + 5.87548/MTT + 0.257L + 0.0060D + 0.07D(P_A - P_C)$
	Midwestern unit train	Dollars per ton	$R = 0.0971 + 315.1854/AV - 1.80380/MTT + 0.0139L + 0.0066D + 0.0454 + (P_A - P_C)$
	Western unit train	Dollars per ton	$R = -0.65113 + 0.00774D + 2.56324M$
Schlottman	Mixed rail/barge	Dollars per ton	$R = 0.15226D^{0.57}$
Arthur D. Little 1975	Unit train	Dollars per ton	$R = 64.5 + 0.645D - 100$
		B. Per Ton Mile Rates	
Ashbury and Costello 1974	Unit train	Mills per ton mile	$r = 7.47 + 712/W$
Bechtel Corporation 1975	Western unit train	Mills per ton mile	$r = 138.59D^{-0391}$

Source: Gordon 1976.

Notes:

R = Total cost per ton of transportation
r = Cost per ton mile
D = Distance in miles
AV = Annual volume in 1000 tons
M = Dummy variable equal to one for shipment crossing the Mississippi, otherwise zero
L = Loading and unloading time in hours
P_A = Delivered price of cheapest alternate fuel
P_C = f.o.b. price of coal
MTT = Trainload size in 1000 tons

annually is \$9.80/ton; the rate for moving 2,700,000 tons annually is \$8.89/ton.

For these reasons, cost estimates specific to the nine ETSI markets were developed for this study. The estimates were done by Harter Williams using the ICC procedures.

IV.2 Route-Specific Cost Estimates

It should be kept in mind when using these estimates that in comparing the ETSI pipeline to the rail alternative, we are basically comparing the cost of moving coal through a new pipeline versus over an existing railroad system. As Farris and Shrock (1978) have pointed out in their article, this suggests that the following may apply:

- Given the remaining useful life of the in-place railroad system, it may be the case that existing capital would have an advantage over new capital if the cost of upgrading is less than the cost of building anew.
- The existing rail system may again have a cost advantage due to the fact that the comparison would consider the incremental costs of operating the existing plant and equipment with the total costs of the new equipment. This effect is compounded if the rail system, as is often asserted, has excess capacity.
- If excess capacity exists, the rails would have an advantage in pricing as they would need only to charge a rate above variable operating cost in attempting to attract new traffic.
- The time frame chosen and the assumed inflation rates are often said to favor the pipeline due to its relatively low level of operating personnel, which insulates pipeline operating costs from the effects of inflation.
- It is often asserted that the railroads cannot expand to adequately handle the increased traffic. While there may be some doubts as to the system in total, it should be kept in mind that the route being considered is operated by financially sound railroad companies, and therefore this statement may well not apply.

Rail cost estimates for the movement of 37.4 MMTA of coal from the Powder River Basin to the proposed markets have been accomplished using the procedures of the ICC, Bureau of Accounts, as set forth in Docket 36970, Annual

Volume Rates on Coal - Wyoming to Flint Creek, Arkansas, and Docket 36980, Southwestern Electric Power Company v. Burlington Northern, Inc., et al., decided May 21, 1979. The following data, derived from the Flint Creek operation, have been imputed to the proposed movement.

- 99.6 Net Tons Per Car - Per Swepco Appendix C, page 10, based on actual loading experience.
- 30.28 Tare Tons Per Car - Per Swepco Appendix C, page 10: 164425.4 G.T.M. Per Car divided by 1032.9 miles less 99.6 net tons.
- 107 Cars Per Train - Swepco Appendix C, page 15, footnote 3.
- 3.6 Locomotive Units Per Train - Swepco Appendix C, page 15, footnote 3.
- .00404 Switching Hours Per Loaded Mile - 250.6 actual minutes divided by 60 mins. divided by 1032.9 loaded miles per Swepco, Appendix C, page 11. Assumes that switching minutes are largely caused by cripples and thus related to mileage.
- 4.5 Loading Hours + 10.2 Unloading Hours = 14.7 Actual Terminal Hours - Per Swepco Appendix C, page 17. Applied to all traffic regardless of length of haul.
- 5.723 Actual Loaded Miles Per Hour After Actual Terminal and Switching
- Deductions - Assumes that line haul time is directly related to length of haul. Per Swepco Appendix C, page 17.
- 21-Year Locomotive Life - Bureau of Accounts chose this figure rather than the railroads' 15-year life or its own "off-the-record" BN and KCS line haul locomotive service life averaging 25.0 years. Per Appendix C, page 14.
- 25-Year Car Life - Since Swepco cars were shipper-owned, this was not at issue. Bureau of Accounts chose this for cabooses rather than the railroads' 20-year or the 32.9-year figure calculated by the Bureau. See Swepco Appendix C, page 14.
- 1.08 Locomotive Spare Factor - Railroads' 1.30 factor data declared not persuasive, per Appendix C, page 14.
- 1.10 Car Spare Factor - This ratio, not at issue in Swepco, was derived from Docket 33145 - PER DIEM CASE (ICC 1979b). It needs checking against ongoing Table A sources, which change from time to time.

- 8568 Operating Hours Per Year - This figure, based on 51 weeks, was accepted at Swepco, Appendix C, page 15, footnote 3. It should be used with caution because it constitutes a 2% contingency factor; whatever time is lost for whatever reason cannot be made up. Actual performance, therefore, can seldom if ever duplicate planned performance.

- 17.2 Percent Return on Embedded Investment - This weighted average figure reflecting normal debt and equity ratios is dealt with on page 21 of the main body of the Swepco order.

- 17.9 Percent Return on New Investment - Owing to the use of pool rather than dedicated new locomotives, the Bureau adopted the lower figure derived at page 21 of the main body of the Swepco order. Since the anticipated tonnage is so large, it would appear reasonable to assume that new financing is needed.

- .47 Coal Station Service Ratio - This is an ICC figure of long standing dealt with in Appendix C, page 16.

It was assumed that locomotives and cars could be bought for $680,000 and $40,000 respectivey, the former being based on a $618,000 purchase figure of the Milwaukee more than a year ago. Return on investment costs at half-life were calculated based upon a 17.9 percent tax level. Similarly, original cost was divided by 21- and 25-year lifespans to arrive at annual depreciation costs which were then divided by loaded and empty car-miles per car.

Adjustment of track costs was complicated by the fact that there appear to be two conflicting trends. The first is that materials introduced for the first time in BN's Detroit Edison (ICC 1980) case reflect lower than system average track costs for high main-line volumes. Countering this reduction are the findings presented in the Cochise case (ICC 1977), indicating that 100-ton equipment has higher than average ton-mile track costs. It is understood that the railroads are developing more data, particularly as regards the second of these two elements.

Using the above Swepco factors inputed to ETSI the following service units were developed:

- Originated and/or Terminated Tons

- Originated and/or Terminated Cars

- Car Days Excluding Bad Order
- Loaded Train Movements
- Equipment sets
- Annual Car Miles Per Car
- Loaded and Empty Car Miles
- Train Miles Adjusted for Non-Revenue
- Millions of Gross Ton Miles adjusted for Non-Revenue
- Unit Miles Adjusted for Non-Revenue
- Switching Minutes Adjusted for Non-Productive Time

To the above service units were applied the unit costs from a Rail Form A application to the U. S. Class One Railroads' Western District for the year 1976. These costs were updated to the level of January 1980 by an ICC procedure identified as 1E3-78 which make adjustments of wages, fuel, other materials, and so on relating to railroads' expenses, rents and taxes but not their returns on investment. The investment returns were raised from the old "embedded" debt-carrying costs to the aforementioned 17.2 percent return level.

The expenses, excluding depreciation, plus rents and taxes were then raised cumulatively 7 percent per year to reflect the levels of 1985 and 1990. This treatment was not accorded to depreciation and capital costs, whose 1980 levels are assumed to continue through 1990. But, in addition, it was recognized that the turnaround times of 1985 and 1990 would likely be more rapid than those achievable in 1980. Those of 1985 were reduced 10 percent and those of 1990 were reduced 15 percent.

The results are the following for the nine markets moving 37.4 MMTA:

	1980	1985	1990
Aggregate Monies (thousands)	537,307	684,475	902,933
Cost per million ton miles	11,701	14,906	19,663

That is, in 1980 it would cost $537,306,745 to make the above specified deliveries. At a cost of $11,701 per million tons miles this would mean then the average per ton cost would be $14.37. By 1990, the costs would be $24.14. The costs to all of the nine individual markets are listed in Table IV-2.

TABLE IV-2

DELIVERY COSTS

Market	1980 Cost per Ton
White Bluff, Arkansas	$14.73
Independence, Arkansas	13.34
Wilton, Louisiana	18.03
Pryor, Oklahoma	11.06
Ponca City, Oklahoma	11.79
Muskogee, Oklahoma	11.61
Lake Charles, Louisiana	17.41
New Roads, Louisiana	18.31
Boyce, Louisiana	18.10

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APPENDIX A

PROPOSED ACTION RAILROAD ROUTES

TABLE A-1

RAILROAD ROUTE - WYOMING MINES TO KANSAS CITY, MO
(Burlington Northern)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Wyoming					
	Douglas	3,839	Converse			
	Orin		Converse			
2	Wendover		Platte	Guernsey	838	Platte
2	Torrington	4,667	Goshen			
	Nebraska					
2	Morrill	966	Scottsbluff			
2	Mitchell	1,859	Scottsbluff			
2	Bayard	12,655	Morrill			
2	Northport	11,396	Morrill	Alliance	6,990	Box Butte
1	Hyannis	366	Grant			
1	Mullen	707	Hooker			
1	Norway		Thomas			
1	Thedford	314	Thomas			
1	Broken Bow	3,962	Custer	Ravenna	1,250	Buffalo
1	Cairo	673	Hall			
1	Grand Island	33,304	Hall			
1	Aurora	3,351	Hamilton			
1	York	7,115	York			
1	Seward	5,572	Seward	Lincoln	163,112	Lancaster
2	Hickman	646	Lancaster			
2	Tecumseh	2,037	Johnson			
2	Table Rock	378	Pawnee			
2	Falls City	5,100	Richardson			
	Missouri					
2	Napier		Holt			
1	Forest City	431	Holt			
1	Amazonia	331	Andrew	St. Joseph	77,679	Buchanan
1	Armour		Buchanan			
1	Weston	1,384	Platte			
1	East Leavenworth		Platte			
1	Ustick		Prairie	Kansas City	472,529	Jackson

TABLE A-2

RAILROAD ROUTE - KANSAS CITY, MO, TO PONCA CITY, OK
(Atchison, Topeka & Santa Fe Railway Company)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Kansas					
1	Ottawa	10,452	Franklin	Emporia	23,447	Lyon
1	Ellinor		Chase			
1	Matfield Green	102	Chase			
1	El Dorado	12,047	Butler			
1	Augusta	6,836	Butler			
1	Winfield	10,361	Cowley	Arkansas City	13,791	Cowley
1				Ponca City (OK)	25,819	Kay

TABLE A-3

RAILROAD ROUTE - KANSAS CITY, KS, TO PRYOR, OK
(Missouri-Kansas-Texas Railroad)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Kansas					
1	Olathe	22,908	Johnson			
1	Paola	4,731	Miami			
2	Moran	483	Allen			
2	Erie	1,418	Neosho	Parsons	12,356	LaBette
2	Oswego	2,255	LaBette			
2	Chetopa	1,663	LaBette			
	Oklahoma					
2	Vinita	5,162	Craig	Pryor	7,797	Mayes

TABLE A-4

RAILROAD ROUTE - KANSAS CITY, MO, TO MUSKOGEE, OK
(Missouri Pacific)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Missouri					
1	Leeds		Jackson			
1	Dodson		Jackson			
	Kansas					
1	Stilwell		Johnson			
1	Bucyrus		Miami			
1	Wagstaff	4,508	Miami			
1	Paola	4,731	Miami	Osawatomie	4,156	Miami
1	Greeley	379	Anderson			
1	Garnett	3,029	Anderson			
1	Westphalia	192	Anderson			
1	Aliceville		Coffey			
1	LeRoy	636	Coffey			
1	Vernon		Woodson			
1	Durand		Woodson			
1	Buffalo	389	Wilson			
1	Benedict	145	Wilson			
1	Roper		Wilson			
1	Altoona	566	Wilson			
1	Neodesha	3,721	Wilson			
1	Independence	10,989	Montgomery			
1	Blake		Montgomery			
1	Jefferson		Montgomery			
1	Dearing	433	Montgomery	Coffeyville	15,537	Montgomery
	Oklahoma					
1	Lenapah	314	Nowata			
1	Nowata	3,354	Nowata			
1	Talala	202	Rogers			
	Oologah	568	Rogers			
1	Claremore	9,897	Rogers			
1	Inola	1,083	Rogers			
2	Wagoner	6,288	Wagoner			
2	Okay	470	Wagoner	Muskogee	37,313	Muskogee

TABLE A-5

RAILROAD ROUTE - KANSAS CITY, MO, TO REDFIELD, AR (White Bluff)
(Missouri Pacific)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Missouri					
1	Leeds		Jackson			
1	Dodson		Jackson			
	Kansas					
1	Stilwell		Johnson			
1	Bucyrus		Miami			
1	Wagstaff	4,508	Miami			
1	Paola	4,731	Miami	Osawatomie	4,156	Miami
1	Greeley	379	Anderson			
1	Garnett	3,029	Anderson			
1	Westphalia	192	Anderson			
1	Aliceville		Coffey			
1	LeRoy	636	Coffey			
1	Vernon		Woodson			
1	Durand		Woodson			
1	Buffalo	389	Wilson			
1	Benedict	145	Wilson			
1	Roper		Wilson			
1	Altoona	566	Wilson			
1	Neodesha	3,721	Wilson			
1	Independence	10,989	Montgomery			
1	Blake		Montgomery			
1	Jefferson		Montgomery			
1	Dearing	433	Montgomery	Coffeyville	15,537	Montgomery
	Oklahoma					
1	Lenapah	314	Nowata			
1	Nowata	3,354	Nowata			
1	Talala	202	Rogers			
1	Oologah	568	Rogers			
1	Claremore	9,897	Rogers			
1	Inola	1,083	Rogers			
2	Wagoner	6,288	Wagoner			
2	Okay	470	Wagoner			
2	Ft. Gibson	1,684	Muskogee			

TABLE A-5 Concluded

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Oklahoma					
2	Gore	587	Sequoyah			
2	Vian	1,351	Sequoyah			
2	Sallisaw	6,057	Sequoyah			
2	Muldrow	1,986	Sequoyah			
2	Greenwood		Sequoyah	Van Buren (AR)	9,452	Crawford
	Arkansas					
2	Alma	2,548	Crawford			
2	Mulberry	1,340	Franklin			
2	Ozark	2,984	Franklin			
2	Spadra		Johnson			
2	Russellville	13,909	Pope			
2	Atkins	2,639	Pope			
2	Morrilton	6,814	Conway			
2	Conway	18,805	Faulkner			
2	West Marche		Pulaski			
2	Levy		Pulaski	North Little Rock	61,768	Pulaski
2	East Little Rock		Pulaski			
2	Sweet Home		Pulaski	Redfield	373	Jefferson

TABLE A-6

RAILROAD ROUTE - KANSAS CITY, MO, TO NEWPORT, AR (Independence) (Missouri Pacific)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Missouri					
1	Independence	111,481	Jackson			
1	Lee's Summit	19,659	Jackson			
1	Pleasant Hill	3,475	Cass			
2	Harrisonville	6,090	Cass			
2	Archie	526	Cass			
2	Adrian	1,526	Bates			
2	Butler	3,850	Bates			
2	Rich Hill	1,590	Bates			
2	Horton		Vernon			
2	Nevada	9,195	Vernon			
2	Milo	90	Vernon			
2	Sheldon	483	Vernon			
2	Irwin		Barton			
2	Lamar	3,791	Barton			
2	Jasper	762	Jasper			
2	Carytown	133	Jasper	Carthage	10,928	Jasper
2	La Russell	115	Jasper			
2	Stotts City	259	Lawrence			
2	Hoberg	50	Lawrence			
2	Aurora	6,191	Lawrence			
2	Crane	1,108	Stone			
2	Galena	452	Stone			
2	Reeds Spring	386	Stone			
2	Branson	2,642	Taney			
2	Hollister	1,334	Taney			

TABLE A-6 Concluded

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Arkansas					
2	Omaha	160	Boone			
2	Myrtle		Boone			
2	Bergman	294	Boone			
2	Pyatt	137	Marion			
2	Turkey		Marion			
2	Summitt	451	Marion			
2	Flippin	1,026	Marion	Cotter	949	Baxter
2	Norfolk	370	Baxter			
2	Calico Rock	928	Izard			
2	Sylamore		Izard			
2	Guion	213	Izard			
2	Myersville		Izard			
2	Cushman Junction	506	Izard			
2	Batesville	7,209	Independence			
2	Newark	849	Independence			
2	Record		Independence			
2	Fitzgerald		Independence			
2	Diaz	1,028	Jackson	Newport	7,854	Jackson

TABLE A-7

RAILROAD ROUTE - KANSAS CITY, MO, TO BOYCE, LA
(Missouri Pacific)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Missouri					
1	Leeds		Jackson			
1	Dodson		Jackson			
	Kansas					
1	Stilwell		Johnson			
1	Bucyrus		Miami			
1	Wagstaff	4,508	Miami			
1	Paola	4,731	Miami	Osawatomie	4,156	Miami
1	Greeley	379	Anderson			
1	Garnett	3,029	Anderson			
1	Westphalia	192	Anderson			
1	Aliceville		Coffey			
1	LeRoy	636	Coffey			
1	Vernon		Woodson			
1	Durand		Woodson			
1	Buffalo	389	Wilson			
	Benedict	145	Wilson			
1	Roper		Wilson			
1	Altoona	566	Wilson			
1	Neodesha	3,721	Wilson			
1	Independence	10,989	Montgomery			
1	Blake		Montgomery			
	Jefferson		Montgomery			
1	Dearing	433	Montgomery	Coffeyville	15,537	Montgomery
	Oklahoma					
1	Lenapah	314	Nowata			
1	Nowata	3,354	Nowata			
1	Talala	202	Rogers			
1	Oolagah	568	Rogers			
1	Claremore	9,897	Rogers			
1	Inola	1,083	Rogers			
2	Wagoner	6,288	Wagoner			
2	Okay	470	Wagoner			
2	Ft. Gibson	1,684	Muskogee			
2	Gore	587	Sequoyah			
2	Vian	1,351	Sequoyah			
2	Sallisaw	6,057	Sequoyah			
2	Muldrow	1,986	Sequoyah			
2	Greenwood	2,753	Sequoyah	Van Buren (AR)	9,452	Crawford

TABLE A-7 Concluded

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County/Parish
	Arkansas					
2	Alma	2,548	Crawford			
2	Mulberry	1,390	Franklin			
2	Ozark	2,984	Franklin			
2	Spadra		Johnson			
2	Russellville	13,909	Pope			
2	Atkins	2,639	Pope			
2	Morrilton	6,814	Conway			
2	Conway	18,805	Faulkner			
2	West Marche		Pulaski			
2	Levy		Pulaski	North Little Rock	61,768	Pulaski
2	East Little Rock		Pulaski			
2	Sweet Home		Pulaski			
2	Redfield	373	Jefferson			
2	Baldwin		Jefferson			
1	Pine Bluff	57,389	Jefferson			
1	Gould	1,683	Lincoln			
1	Dumas	5,290	Desha	McGehee	5,413	Desha
1	Dermott	4,250	Chicot			
1	Jerome	76	Drew			
1	Montrose	620	Ashley			
1	Portland	662	Ashley			
1	Parkdale	459	Ashley			
1	Wilmot	1,202	Ashley			
	Louisiana					
1	Jones		Morehouse			
1	Bonita	327	Morehouse			
1	Mer Rouge	615	Morehouse			
1	Collinston	428	Morehouse			
1	Wham		Ouachita			
1	Swartz		Ouachita	Monroe	61,016	Ouachita
1	Bosco		Ouachita			
1	Riverton		Caldwell			
1	Columbia	1,206	Caldwell			
1	Clarks	898	Caldwell			
1	Olla	1,476	La Salle			
1	Urania	885	La Salle			
1	Georgetown	305	Grant			
1	Pollock	351	Grant			
1	Simms		Grant			
1	Tioga		Rapides	Alexandria Boyce	49,481 1,263	Rapides Rapides

TABLE A-8

RAILROAD ROUTE - KANSAS CITY, MO, TO LAKE CHARLES, LA
(Kansas City Southern and Louisiana & Arkansas Railway)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County/Parish
	Missouri					
2	Amsterdam		Bates	Pittsburgh (KS)	20,011	Crawford
1	Joplin	40,139	Jasper			
1	Neosho	7,809	Newton			
	Arkansas					
1	Gravette		Benton			
2	Siloam		Benton			
	Springs		Benton	Watts	346	Adair
	Oklahoma					
1	Stilwell	2,388	Adair			
1	Sallisaw	6,057	Sequoyah			
1	Poteau	5,966	Le Flore	Heavener	2,585	Le Flore
	Arkansas					
1	Howard		Polk			
1	Mena	4,530	Polk	DeQueen	4,083	Sevier
1	Ashdown	3,522	Little River			
	Texas					
1	Texarkana	33,813	Bowie			
	Arkansas					
1	Ravenna		Miller			
	Louisiana					
1	Blanchard	789	Caddo	Shreveport	185,711	Caddo
2	Mansfield	6,843	De Soto			
2	Many	3,217	Sabine	Leesville	8,473	Vernon
2	DeRidder	10,422	Beauregard			
2	DeQuincy	3,520	Calcasieu	Mossville	N/A	Calcasieu
				Lake Charles	76,087	Calcasieu

TABLE A-9

RAILROAD ROUTE - KANSAS CITY, MO, TO NEW ROADS, LA (Wilton)
(Kansas City Southern and Louisiana & Arkansas Railways)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County/Parish
	Missouri					
2	Amsterdam		Bates	Pittsburgh (KS)	20,011	Crawford
1	Joplin	40,139	Jasper			
1	Neosho	7,809	Newton			
	Arkansas					
1	Gravette		Benton			
2	Siloam Springs		Benton	Watts (OK)	346	Adair
	Arkansas					
1	Howard		Polk			
1	Mena	4,530	Polk	DeQueen	4,083	Sevier
1	Morris Ferry		?			
1	Winthrop	274	Little River			
1	Alleene		Little River			
1	Wilton	406	Little River			
1	Ashdown	3,695	Little River			
1	Texarkana	33,813	Miller			
1	Ravenna		Miller			
	Louisiana					
1	Blanchard	789	Caddo	Shreveport	185,711	Caddo
1	Coushatta	1,445	Red River			
1	Colfax	1,916	Grant	Alexandria	49,481	Rapides
1	Mansura	1,819	Avoyelles	New Roads	4,145	Pointe Coupee

TABLE A-10

RAILROAD ROUTE - KANSAS CITY, MO, TO WILTON, LA
(Missouri Pacific)

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County
	Missouri					
1	Leeds		Jackson			
1	Dodson		Jackson			
	Kansas					
1	Stilwell		Johnson			
1	Bucyrus		Miami			
1	Wagstaff	4,508	Miami			
1	Paola	4,731	Miami	Osawatomie	4,156	Miami
1	Greeley	379	Anderson			
1	Garnett	3,029	Anderson			
1	Westphalia	192	Anderson			
1	Aliceville		Coffey			
1	LeRoy	636	Coffey			
1	Vernon		Woodson			
1	Durand		Woodson			
1	Buffalo	389	Wilson			
	Benedict	145	Wilson			
1	Roper		Wilson			
1	Altoona	566	Wilson			
1	Neodesha	3,721	Wilson			
1	Independence	10,989	Montgomery			
1	Blake		Montgomery			
1	Dearing	433	Montgomery	Coffeyville	15,537	Montgomery
	Oklahoma					
1	Lenapah	314	Nowata			
1	Nowata	3,354	Nowata			
1	Talala	202	Rogers			
1	Oologah	568	Rogers			
1	Claremore	9,897	Rogers			
1	Inola	1,083	Rogers			
1	Wagoner	6,288	Wagoner			
2	Okay	470	Wagoner			
2	Ft. Gibson	1,684	Muskogee			
2	Gore	587	Sequoyah			
2	Vian	1,351	Sequoyah			
2	Sallisaw	6,057	Seqooyah			
2	Muldrow	1,986	Sequoyah			
2	Greenwood	2,753	Sequoyah	Van Buren (AR)	9,452	Crawford

TABLE A-10 Continued

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County/Parish
	Arkansas					
2	Alma	2,548	Crawford			
2	Mulberry	1,340	Franklin			
2	Ozark	2,984	Franklin			
2	Spadra		Johnson			
2	Russellville	13,909	Pope			
2	Atkins	2,639	Pope			
2	Morrilton	6,814	Conway			
2	Conway	18,805	Faulkner			
2	West Marche		Pulaski			
2	Levy		Pulaski	North Little Rock	61,768	Pulaski
2	East Little Rock		Pulaski			
2	Sweet Home		Pulaski			
2	Redfield	373	Jefferson			
2	Baldwin		Jefferson			
1	Pine Bluff	57,389	Jefferson			
1	Gould	1,683	Lincoln			
1	Dumas	3,290	Desha	McGehee	5,413	Desha
1	Dermott	4,250	Chicot			
1	Jerome	76	Drew			
1	Montrose	620	Ashley			
1	Portland	662	Ashley			
1	Parkdale	459	Ashley			
1	Wilmot	1,202	Ashley			
	Louisiana					
1	Jones		Morehouse			
1	Bonita	327	Morehouse			
1	Mer Route	615	Morehouse			
1	Collinston	428	Morehouse			
1	Wham		Ouachita			
1	Swartz		Ouachita	Monroe	61,016	Ouachita
1	Bosco		Ouachita			
1	Riverton		Caldwell			
1	Columbia	1,206	Caldwell			
1	Clarks	898	Caldwell			
1	Olla	1,476	La Salle			
1	Urania	885	La Salle			
1	Georgetown	305	Grant			
1	Pollock	351	Grant			
1	Simms		Grant			
1	Tioga		Rapides	Alexandria	49,481	Rapides

TABLE A-10 Concluded

Class of Track	Town	Population	County	Maintenance/ Crew Change Stop	Population	County/Parish
1	Lecompte	1,516	Rapides			
1	Cheneyville	1,078	Rapides			
1	Bunkie	5,129	Avoyelles			
1	Ross		St. Landry			
1	Melville	1,787	St. Landry			
1	Livonia	653	Pointe Coupee			
1	Addis	709	W. Baton Rouge			
1	Port Allen	5,804	W. Baton Rouge			
1	Baton Rouge	310,922	Baton Rouge	Wilton		St. James

APPENDIX B

RAILROAD OPERATING INFORMATION

Table B-1
UNIT TRAIN SCHEDULE - POWDER RIVER BASIN TO WILTON, LA

Railroad	Origin	Destination	Intermediate Stops	O-D Mileage	Time Required	Activity at Intermediate Stop	Time Required	Activity at Destination	Time Required	Number of Locomotives	Number of Crews
KCS	Kansas City					Standing Inspection 500 Mile Inspection S/O Bad Orders P/W Cars Repaired	3.5				
KCS	Kansas City		Pittsburg	128.2	7.5	Crew Change Add 3 locomotives	1.9			3	1
KCS	Pittsburg		Watts	107.8	6.9	Crew Change	.5			6	1
KCS	Watts		Heavener	102.0	5.4	Crew Change Fuel Locomotives 500 Mile Inspection	1.7			6	1
KCS	Heavener		DeQueen	95.3	6.7	Change Crew S/O 2 Locomotives	.6			6	1
KCS	DeQueen		Shreveport	120.0	7.7	Crew Change Pull by Inspector	1.0			4	1
KCS	Shreveport		Alexandria	148.6	9.4	Change crew	.5			4	1
KCS	Alexandria		Baton Rouge	106.2	6.7	Change crew	.5			4	1
KCS	Baton Rouge	Gramercy		40.3	2.9			Unload coal 500 Mile Inspection	5.5	4	1
KCS	Gramercy		Baton Rouge	40.3	2.2	Change crew	.5			4	1
KCS	Baton Rouge		Alexandria	106.2	5.6	Change crew	.5			4	1
KCS	Alexandria		Shreveport	148.6	7.9	Change crew Pull by Inspector	1.0			4	1
KCS	Shreveport		DeQueen	120.0	6.4	Change crew	.5			4	1
KCS	DeQueen		Heavener	95.3	4.7	Change crew Fuel Locomotives 500 Mile Inspection	1.7			4	1
KCS	Heavener		Watts	102.0	4.8	Change crew	.5			4	1
KCS	Watts		Pittsburg	107.8	6.5	Change Crew S/O Locomotive	.6			4	1
KCS	Pittsburg	Kansas City		128.2	7.9			Deliver to BN	21.0 Hours Incl. 5 hrs. unload		
		Total		1656.8 Mi	99.2 Hrs.						

Table B-2

UNIT TRAIN SCHEDULE - JACOBS RANCH TO LAKE CHARLES, LA

Railroad	Origin	Destination	Intermediate Stops	O-D Mileage	Time Required	Activity at Intermediate Stop	Time Required	Activity at Destination	Time Required	Number of Locomotives	Number of Crews
KCS	Kansas City					Standing Inspection 500 Mile Inspection S/O & P/W Bad Order Cars Cut cars repaired	3.5				
KCS	Kansas City		Pittsburg	128.2	7.5	Crew change Add 3 locomotives	1.9			3	1
KCS	Pittsburg		Watts	107.8	6.9	Crew change	.5			6	1
KCS	Watts		Heavener	102.0	5.4	Crew change Fuel locomotives 500 Mile Inspection	1.7			6	1
KCS	Heavener		DeQueen	95.3	6.7	Crew change S/O 2 locomotives	.6			6	1
KCS	DeQueen		Shreveport	120.0	7.7	Crew change Pull by inspector	1.0			4	1
KCS	Shreveport		Leesville	115.1	7.2	Change crews	.5			4	1
KCS	Leesville	Lake Charles		67.6	4.3	Unload coal 500 Mile Inspection	5.5			4	1
KCS	Lake Charles		Leesville	67.6	4.1	Change crew	.5			4	1
KCS	Leesville		Shreveport	115.1	6.9	Change crew Pull by inspection	1.0			4	1
KCS	Shreveport		DeQueen	120.0	6.4	Change Crew	.5			4	1
KCS	DeQueen		Heavener	95.3	4.7	Change crews Fuel locomotives 500 Mile Inspection	1.7			4	1
KCS	Heavener		Watts	102.0	4.8	Change crews	.5			4	1
KCS	Watts		Pittsburg	107.8	6.5	Change crews S/O one locomotive	.6			4	1
KCS	Pittsburg	Kansas City		128.2	7.9			Deliver to BN		3	1
				1472 miles	87.0 hours		20.0 hours Includes 5 hours unloading				14 crews

Table B-3
UNIT TRAIN SCHEDULE - RAWHIDE TO PRYOR, OK

Railroad	Origin	Destination	Intermediate Stops	O-D Mileage	Time Required	Activity at Intermediate Stop	Time Required	Activity at Destination	Time Required	Number of Locomotives	Number of Crews
MKT	Kansas City					Interchange Inspect Train 1 Engineer 2 Carmen	1 Hour			4	1
	Kansas City	Parsons		133	7 Hours	Crew Change	.25				
	Parsons	GRDA Plant		84	5 Hours			Unload Coal Crew Change	5 Hours .25		1
	GRDA Plant	Parsons		84	4.5 Hrs.			Fuel and Service Locomotives 1 Hostler 1 Laborer 1 Machinist 1 Electrician Crew Change	1 Hour		1
	Parsons	Kansas City		138	7 Hours			Interchange	1 Hour		1

Table B-4
UNIT TRAIN SCHEDULE - BLACK THUNDER TO PONCA CITY, OK

Railroad	Origin	Destination	Intermediate Stops	O-D Mileage	Time Required	Activity at Intermediat Stop	Time Required	Activity at Destination	Time Required	Number of Locomotives	Number of Crews
BN-ATSF	Black Thunder	Ponca City	Kansas City	1122 2244	31 1/4 hrs. on AT&SF	Motive Power Adjustment	N/A	N/A	N/A	Number of locomotives varies on route	20

Table B-5
UNIT TRAIN SCHEDULE - BUCKSKIN TO NEW ROADS, LA

Railroad	Origin	Destination	Intermediate Stops	O-D Mileage	Time Required	Activity at Intermediate Stop	Time Required	Activity at Destination	Time Required	Number of Locomotives	Number of Crews
MP		Neff Yd. (KCMO)						MP Crew on Train	2.75	4	1
MP	Neff Yd. (KCMO)	Osawatomie		56.2	3.30						
MP	Osawatomie	Coffeyville	Dixon	133.4	10.64	Inspection	0.30	Crew Change	0.50	4	1
MP	Coffeyville	Van Buren	Claremore Cookson Upson	165.6	9.69	Inspection Fuel 500-mi Brake Test	0.30 0.75 0.75	Crew Change	0.50	3	1
MP	Van Buren	N. Little Rock	Alix Morrillton	153.2	9.13	Inspection Inspection	0.30 0.30	Crew Change	0.50	3	1
MP	N. Little Rock	McGehee	Pine Bluff	102.9	7.57	Inspection	0.30	Crew Change	0.50	3	1
MP	McGehee	Monroe	Sunshine	94.2	5.57	Inspection	0.30	Crew Change	0.50	3	1
MP	Monroe	Alaxandria	Grayson	96.7	6.13	500-mi Brake Test	0.75	Crew Change	0.50	3	1
MP	Alexandria	New Roads	Meeker Bunkie	91.6	6.38	Inspection Inspection	0.30 0.30	Enter Unloading Crew Change Exit	1.00 5.00 1.00	3	1
MP	New Roads	Alexandria	Bunkie Meeker	91.6	6.38	Inspection	0.30	Crew Change Power Service	1.25	3	1
MP	Alexandria	Monroe	Georgetown	96.7	5.69	Inspection	0.30	Crew Change	0.50	3	1
MP	Monroe	McGehee	Collingston	94.2	6.02	500-mi. Brake Test	0.75	Crew Change	0.50	3	1
MP	McGehee	N. Little Rock	Pine Bluff	102.9	8.35	Inspection	0.30	Crew Change	0.50	3	1
MP	N. Little Rock	Van Buren	Morrillton Alix	153.2	7.92	Inspection Inspection	0.30 0.30	Crew Change	0.50	3	1
MP	Van Buren	Coffeyville	Upson Cookson Claremore	165.6	10.54	Inspection Inspection 500-mi Brake Test	0.30 0.30 0.75	Crew Change	0.50	3	1
MP	Coffeyville	Osawatomie	Dixon	133.4	7.30	Inspection	0.30	Crew Change	0.50	3	1
	Osawatomie	Neff Yd. (KCMO)		56.2	4.32						
MP	Neff Yd. (KCMO)	Murray Yd. (BN)			4.00						

Table B-6

UNIT TRAIN SCHEDULE - JACOBS RANCH TO NEWARK, AR

Railroad	Origin	Destination	Intermediate Stops	O-D Mileage	Time Required	Activity at Intermediate Stop	Time Required	Activity at Destination	Time Required	Number of Locomotives	Number of Crews
MP	Kansas City (BN)	Neff Yd						Inspection Add 4th, 5th, 6th Units Crew Change	2.5	6	1
MP	Neff Yard	Carthage	Pleasant Hill	149.1	10.05	Cut Out 5th, 6th Units	0.75	Crew Change	0.25	4	1
			Ore			Inspection	0.30				
			Lamar			Inspection	0.30				
MP	Carthage	Cotter	Branson	146.1	7.29	Inspection	0.30	Crew Change Service Power	0.75	4	1
MP	Cotter	Newark	Calico Rock	111.2	5.08	Inspection	0.30	Enter Unloading Crew Change Exit	7.50	4	1
			Batesville			Inspection	0.30				
MP	Newark	Cotter	Batesville	111.2	4.82	Inspection	0.30	Crew Change	0.25	4	1
			Calico Rock			Inspection	0.30				
MP	Cotter	Carthage	Bergman	146.1	5.95	Inspection	0.30	Crew Change	0.25	4	1
			Crane			Inspection	0.30				
MP	Carthage	Neff Yd	Sheldon	149.1	10.72	Inspection	0.30			4	1
			Rich Hill			Inspection	0.30				
			Murray Yd (BN)			Remove 4th Unit	0.30	4th Unit Return Lite	2.00	3	1

Table B-7

UNIT TRAIN SCHEDULE - KANSAS CITY TO BOYCE, LA

Railroad	Origin	Destination	Intermediate Stops	O-D Mileage	Time Required (hours)	Activity at Intermediate Stop	Time Required	Activity at Destination	Time Required (hours)	Number of Locomotives	Number of Crews
MP		Kansas City (Neff Yd)					2.50	Add 1 unit Pull-by Inspection Crew Change, Switch Out Bad Orders	2.50	4	1
MP	Kansas City (Neff Yd)	Osawatomie		56.7	3.12			Pull-by Inspection Crew Change	0.25	4	1
MP	Osawatomie	Coffeyville	Dixon	133.4	5.39	Inspection	0.30	Pull-by Inspection Crew Change	0.25	3	1
MP	Coffeyville	Van Buren	Claremore Cookson Upson	165.6	7.24	Inspection Fuel Inspection	0.30 0.75	Crew Change Pull-by Inspection	0.25	3	1
MP	Van Buren	N. Little Rock	Alix Morrilton	153.2	6.04	Inspection Inspection	0.30 0.30	Crew Change Pull-by Inspection	0.25	3	1
MP	N. Little Rock	McGehee	Pine Bluff	102.9	4.48	Inspection	0.30	Crew Change Pull-by Inspection	0.25	3	1
MP	McGehee	Monroe	Sunshine	94.2	3.93	Inspection	0.30	Crew Change Pull-by Inspection	0.25	3	1
MP	Monroe	Boyce	Grayson Texmo Jct.	107.9	5.00	Inspection New Orders	0.30 0.26	Enter Dump Unloading Exit Dump Crew Change	1.00 5.00 1.00 0.25	3	1
MP	Boyce	Monroe	Texmo Jct. Georgetown	107.9	4.56	New Orders Inspection	0.25 0.30	Crew Change Pull-by Inspection	0.25	3	1
MP	Monroe	McGehee	Collinston	94.2	3.8	Inspection	0.30	Crew Change Pull-by Inspection	0.25	3	1
MP	McGehee	North Little Rock	Pine Bluff	101.7	4.33	Inspection	0.30	Crew Change Pull-by Inspection	0.25	3	1
MP	North Little Rock	Van Buren	Morrilton Alix	153.2	5.86	Inspection Inspection	0.30 0.30	Crew Change Pull-by Inspection	0.25	3	1
MP	Van Buren	Coffeyville	Upson Cookson Claremore	165.6	7.49	Inspection Inspection, Fuel Inspection	0.30 0.75 0.30	Crew Change Pull-by Inspection	0.25	3	1
MP	Coffeyville	Osawatomie	Dixon	133.4	4.66	Inspection	0.30	Fuel Crew Change PBL Cert. Inspection	0.75	3	1
MP	Osawatomie	Kansas City (Murray Yd)		57	4.25			Break M/U on 4th Unit	0.50	3	1

Table B-8

UNIT TRAIN SCHEDULE - ANTELOPE TO REDFIELD, AR

Railroad	Origin	Destination	Intermediate Stops	O-D Mileage	Time Required	Activity at Intermediate Stop	Time Required	Activity at Destination	Time Required	Number of Locomotives	Number of Crews
		Jacobs Ranch						Load Coal Inspection	6 hours		
BN BN	Jacobs Ranch Guernsey	Guernsey Alliance		132.7 129.5				Crew Change Crew Change Inspect Train Inspect and Service Locomotive		3 3	1 1
BN BN	Alliance Ravenna	Ravenna Lincoln		237.8 126.3				Crew Change Crew Change Inspect Train Fuel and Service Locomotive		3 3	1 1
BN BN	Lincoln St. Joseph	St. Joseph Kansas City		146.9 37.7				Crew Change Crew Change Interchange Inspect Train		3 3	1 1
MP	Kansas City	Osawatomie		33.3	3.12			Crew Change Pull-by Inspection	.25		1
MP	Osawatomie	Coffeyville	Oleon	133.6	5.39	Standing Inspection	.3	Crew Change Pull-by Inspection	.23		1
MP	Coffeyville	Van Buren	Lenapah	163.6	7.29	Refuel/ 300-mile Inspection		Crew Change Pull-by Inspection			1
			Claremore			Standing Inspection					
			Upson			Standing Inspection	2.35				
MP	Van Buren	N. Little Rock	Alle	133.2	6.04	Standing Inspection	.3	Crew Change Pull-by Inspection			1
			Morrilton			Standing Inspection	.3				
MP MP	N. Little Rock Redfield	Redfield N. Little Rock		25.0 23.0	8.82			Unload Coal Crew Change Pull-by Inspection	5.0		1
MP	N. Little Rock	Van Buren	Morrilton	153.2	3.56	Standing Inspection	.3	Crew Change Pull-by Inspection			1
			Alle			Standing Inspection					
MP	Van Buren	Coffeyville	Upson	165.6	6.76			Crew Change Pull-by Inspection			1
			Claremore Lenapah								
MP	Coffeyville	Osawatomie	Dixon	133.4	4.66	Inspection	.3	Crew Change Refuel Brake Inspection			
MP	Osawatomie	Kansas City		35.3	4.25			Crew Change Interchange Inspect Train			1
BN	Kansas City	St. Joseph		37.7							
BN	St. Joseph	Lincoln		246.9				Crew Change		3	1
BN BN	Lincoln Ravenna	Ravenna Alliance		126.3 237.8				Crew Change Inspect Train Fuel, Service and Inspect Locomotive		3	1
								Crew Change Crew Change Inspect Train Fuel, Service Locomotives		3 3	1 1
BN BN	Alliance Guernsey	Guernsey Jacobs Ranch		128.8 232.7							
								Crew Change		3 3	1

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